

**ExxonMobil**  
**Refining & Supply Company**  
Global Remediation

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**ExxonMobil**  
*Refining & Supply*

September 12, 2005

Mr. Noman Chowdhury  
California Regional Water Quality Control Board  
Los Angeles Region  
320 West 4th Street, Suite 200  
Los Angeles, California 90013

Subject: **WORK PLAN FOR FEASIBILITY TESTING FOR  
EXXONMOBIL OIL CORPORATION FORMER SERVICE STATION #18-MF0  
15757 PARAMOUNT BOULEVARD, PARAMOUNT, CALIFORNIA  
(CRWQCB-LAR ID #I-06633A)**

Dear Mr. Chowdhury:

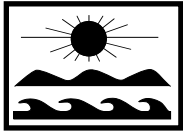
Please find enclosed a copy of the work plan for feasibility testing dated September 12, 2005, for the above-referenced site. To continue the necessary feasibility testing in accordance with the 60-day policy, this work plan has been prepared by Holguin, Fahan & Associates, Inc. (HFA) under the direction of ExxonMobil Oil Corporation.

If you have any questions or require additional information, please contact Mr. James Anderson, of Holguin, Fahan & Associates, Inc., at (805) 641-4089, or the undersigned at (310) 212-1870.

Sincerely,



Gene Ortega  
Project Manager  
ExxonMobil Oil Corporation



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# HOLGUIN, FAHAN & ASSOCIATES, INC.

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ENVIRONMENTAL      MANAGEMENT      CONSULTANTS

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(CRWQCB-LAR ID #I-06633A)**

Dear Mr. Chowdhury:

Holguin, Fahan & Associates, Inc. (HFA), on behalf of ExxonMobil Oil Corporation (ExxonMobil), is pleased to present the following work plan outlining the proposed methodology for performing a pump test at the above-referenced site. Due to the detection of MTBE at concentrations greater than three orders of magnitude in excess of the drinking water MCL for the source zone monitoring well, this work plan has been prepared to obtain hydrologic data and to evaluate pump-and-treat as a potential technology for site remediation. A list of acronyms used in this work plan is enclosed.

## **BACKGROUND**

### **SITE LOCATION AND CONTACT PERSONS**

ExxonMobil Former Service Station #18-MF0 is located at 15757 Paramount Boulevard, on the northwestern corner of the intersection of Alondra Boulevard and Paramount Boulevard, in the city of Paramount, California (see Figure 1 - Site Location Map). The surrounding areas consist of commercial and residential properties. An ARCO brand service station is located across the intersection to the southeast (see Figure 2 - Site Vicinity Map).

The responsible party contact is Mr. Gene Ortega, ExxonMobil Oil Corporation, 3700 West 190th Street, TPT2, Torrance, California, 90504, (310) 212-1870. The environmental consultant contact is Mr. James Anderson, Holguin, Fahan & Associates, Inc., 50 West Main Street, Ventura, California, 93001, (805) 641-4089. The regulatory agency contact is Mr. Noman

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**ENVIRONMENTAL   SCIENTISTS   GEOLOGISTS   ENGINEERS**  
**Contaminated Site Assessment • Site Remediation • Mobile Remediation • CPT Service • Groundwater Monitoring**

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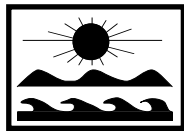
50 West Main Street  
Ventura, California 93001  
805-641-1056

948 North Lemon Street  
Orange, California 92867  
714-210-5971

1003 East Cooley Drive, Suite 201  
Colton, California 92324  
909-422-8988

1215 South Park Lane, Suite 1  
Tempe, Arizona 85281  
480-505-3332

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Chowdhury, California Regional Water Quality Control Board, Los Angeles Region (4), 320 West 4th Street, Suite 200, Los Angeles, California, 90013, (213) 576-6704.

## **SITE DESCRIPTION**

The subject site was divested by ExxonMobil in June 2002, and is currently an active Fuel for Less brand gasoline station, which includes three 10,000-gallon gasoline USTs, one 10,000-gallon diesel UST, three dispenser islands, associated double-walled product and vent piping, a station building, and a car wash (see Figure 3 - Plot Plan for the facility locations).

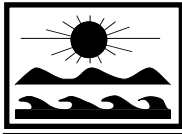
## **GEOLOGY AND HYDROGEOLOGY**

The site lies at an elevation of 70 feet above MSL, and the local topography slopes toward the south (USGS, 1967). The site lies in the Downey Plain portion of the Central Basin Pressure Area of the Los Angeles Coastal Plain (CDWR, 1961). Surface waters in the site vicinity drain as part of the watershed of the Lower Los Angeles River (CRWQCB-LAR, 1994). The nearest bodies of surface water are the Los Angeles River, located 1.5 miles to the west, and the San Gabriel River, located 2 miles to the east (USGS, 1967).

Soil in the site vicinity consists of an estimated 150 feet of Recent alluvium, deposited by the Los Angeles and San Gabriel Rivers. Within the alluvium occurs the Bellflower Aquiclude, the Semi-Perched Aquifer, and the regional Gaspar Aquifer, the top of which occurs at approximately 120 fbg (CDWR, 1961). Assessment activities indicate that the alluvium beneath the site consists of sand from the surface to 17 fbg, clayey silt and silt from 17 to 30-35 fbg, silty sand and sand from 30-35 to 40 fbg, and sandy silt and silt from 40 to 50 fbg, the maximum depth investigated (see Figure 4 - Geologic Cross-Section A-A') (HFA, 2003; HFA, 2005a). The soil encountered from 17 to 50 fbg is interpreted to be within the Bellflower Aquiclude (CDWR, 1961).

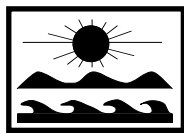
The site is located in the Central Groundwater Basin of the Los Angeles-San Gabriel Hydrographic Unit (CRWQCB-LAR, 1994). During the second quarter 2005 groundwater monitoring event performed on May 25, 2005, the depth to groundwater in the wells ranged from 17.08 to 18.35 ft-TOC, and the groundwater flow direction was to the west-northwest with a horizontal gradient of 0.002 (see Figure 5 - Groundwater Elevation Contour Map for Second Quarter 2005) (HFA, 2005b). First groundwater is interpreted to be within the Semi-Perched Aquifer, within the Bellflower Aquiclude (CDWR, 1961).

According to the CRWQCB-LAR, groundwater within the basin has existing beneficial use for municipal, industrial, and agricultural purposes (CRWQCB-LAR, 1994). Based on information provided by the LACDPW Hydrologic Records Section, six groundwater production wells were identified within 1 mile of the site (LACDPW, 2002).



WELL #	DISTANCE FROM SITE	USE	OWNER	TOTAL DEPTH (fbg)
942H	3,700 feet southeast	Irrigation Supply (Private)	George Yamamoto	147
932E	4,500 feet south-southwest	Industrial Supply	Ohio Rubber Company	222
920A	5,000 feet northwest	Irrigation Supply (Private)	Sal Gutierrez	150
921D	1 mile west	Municipal Supply	City of Signal Hill	405
921N	1 mile west	Municipal Supply	City of Signal Hill	950
922E	1 mile southwest	Industrial Supply	Southern California Edison	676





## **PREVIOUS WORK**

Quarterly groundwater monitoring was implemented during the fourth quarter of 2003. PSH has not been detected. Dissolved-phase benzene and TPH as diesel have not been detected for any of the monitoring wells. Dissolved-phase MTBE and TBA are localized surrounding and downgradient of the current USTs, with the maximum concentrations consistently measured for the well located directly downgradient of the USTs (MW-4R). During the monitoring program, dissolved-phase MTBE concentrations have declined by two orders of magnitude for well MW-1R, while increasing by nearly an order of magnitude for well MW-4R (see Figure 6 - Benzene Concentrations in Groundwater for Second Quarter 2005, Figure 7 - MTBE/TBA Concentrations in Groundwater for Second Quarter 2005, and Table 1 - Summary of Groundwater Sample Analytical Results) (HFA, 2005b).

## **PROPOSED WORK**

### **RATIONALE FOR PROPOSED WORK**

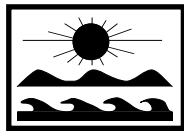
Due to the measurement of dissolved-phase MTBE and TBA for the monitoring wells located adjacent to the current USTs at maximum concentrations of 48,400 and 12,900  $\mu\text{g/l}$ , respectively, during the second quarter 2005 groundwater monitoring event, and because concentrations for source zone well MW-4R have shown an increasing trend, evaluation of groundwater conditions and remedial technologies to control the off-site migration of dissolved-phase MTBE and TBA is required (see Figure 7) (HFA, 2005b).

First groundwater is encountered at 18 fbg, within the clayey silt and silt horizon present from 17 to 30-35 fbg. The screened intervals of the on-site groundwater monitoring wells are completed in both this shallow silt horizon, and within the underlying silty sand and sand horizon from 30-35 to 40 fbg (see Figure 4). To determine the hydraulic and pumping characteristics of the two saturated zones, installation of wells discretely screened within each of the saturated zones for feasibility testing is required.

### **DESCRIPTION OF ALL WORK TO BE PERFORMED - WELL INSTALLATIONS**

Prior to performing any subsurface work, HFA, in compliance with the ExxonMobil ground disturbance protocol, will:

- review the site as-built drawing;
- perform a pre-drilling site visit to investigate and mark all proposed drilling locations and gather site-specific product systems data;



- order utility markouts from Underground Service Alert of Southern California and a private subsurface geophysical investigation; and
- clear all drilling locations of subsurface lines using vacuum digging techniques to a diameter larger than the hollow-stem augers and 8 feet in depth.

### **Well Installation and Completion**

HFA proposes to install one piezometer well (P-1) using hollow-stem auger techniques (see Figure 3 for the proposed location, and Attachment 1 for the well construction procedures). The piezometer well will be drilled to 41 fbg, and installed adjacent to existing groundwater monitoring well MW-4R.

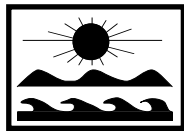
The well will be continuously cored to its total depth to provide detailed lithographic information. Selected soil samples will be submitted to a California State certified testing facility, where they will be analyzed for TPH as gasoline using the CA LUFT GC/FID Method, and for BTEX, MTBE, TBA, TAME, DIPE, ETBE, and ethanol using EPA Method 8260B. The soil samples submitted to the laboratory will be collected and analyzed in accordance with EPA Method 5035.

The piezometer well will be dual-completed with 4-inch-OD PVC casings screened within the clayey silt and silt horizon from 17 to 27 fbg (P-1A), and within the silty sand and sand horizon from 31 to 41 fbg (P-1B) (see Figure 4, Attachment 1, and Attachment 2 for the proposed well construction details). The screen intervals may be modified based upon the results of the field logging. The piezometer well will be properly developed and surveyed in accordance with the requirements of AB2886.

The well will be purged and sampled in accordance with CRWQCB-LAR requirements, and incorporated into the site's quarterly groundwater monitoring and sampling program (see Attachment 3 for the procedures). The groundwater samples will be submitted to a California State certified testing facility, where they will be analyzed for TPH as gasoline using the CA LUFT GC/FID Method, and for BTEX, MTBE, TBA, TAME, DIPE, ETBE, and ethanol using EPA Method 8260B.

### **Equipment Decontamination Procedures**

Sampling equipment will be decontaminated using a nonphosphate soap and water wash, and two tap-water rinses. The hollow-stem augers will be decontaminated using a steam cleaner between drilling locations.



### **Waste Management Procedures**

All soil cuttings and decontamination/purge water will be placed in 55-gallon, DOT-approved drums. Upon receipt of laboratory analytical results, the waste will be transported to licensed recycling facilities.

### **DESCRIPTION OF ALL WORK TO BE PERFORMED - FEASIBILITY TESTING**

To obtain hydrologic data and evaluate groundwater pump-and-treat as a remedial technology for the site, HFA proposes to perform up to a 40-hour groundwater pump test to determine the hydraulic conductivity of the aquifer, the permeability of the two saturated zones, the sustainable pumping rate, and the time-dependent capture zone (see Attachment 4 for the procedures). Monitoring well MW-4R will be used as the initial pumping well, and on-site piezometer well P-1 (casings A and B) and monitoring well MW-6 will be used as observation wells (see Figure 3). The observation wells will be monitored for water level changes using pressure transducers. After completion of testing using well MW-4R, groundwater will be allowed to recharge, and well P-1A will be used as an extraction well while groundwater levels are monitored in wells MW-4R and P-1B, and subsequently well P-1B will be used as an extraction well while groundwater levels are monitored in wells MW-4R and P-1A. The pumping from each extraction well will last approximately 8 hours, with 8 hours of recharge between each pumping episode. Extracted groundwater will be temporarily stored in an on-site tank pending transportation to Crosby & Overton's facility in Long Beach, California, for recycling.

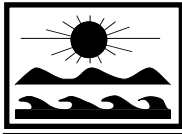
### **WORK SCHEDULE**

Work will begin within 4 weeks of acceptance of this work plan by the CRWQCB-LAR. The CRWQCB-LAR will be notified at least 72 hours prior to performing field activities. A feasibility test report will be submitted to the CRWQCB-LAR approximately 8 weeks after completion of the work.

### **SITE SAFETY PLAN**

A worker health and safety plan developed by HFA's industrial hygienist for UST site investigations is included as Attachment 5. Procedures for conducting all work are outlined in this plan, and site-specific information is provided on the cover page and job safety analysis.

All work will be conducted under the supervision of a registered geologist or civil engineer, and will be accomplished in accordance with all regulatory requirements, as defined by the SWRCB LUFT field manual.



**HOLGUIN,  
FAHAN &  
ASSOCIATES, INC.**

ENVIRONMENTAL MANAGEMENT CONSULTANTS

Mr. Noman Chowdhury  
CRWQCB-LAR  
September 12, 2005 - Page 7

Holguin, Fahan & Associates, Inc. trusts that this work plan for feasibility testing meets your requirements. If you have any questions or require additional information, please contact Mr. James Anderson at (805) 641-4089 or James\_Anderson@hfa.com.

Respectfully submitted,

James Anderson, REA  
Associate Engineer  
Holguin, Fahan & Associates, Inc.

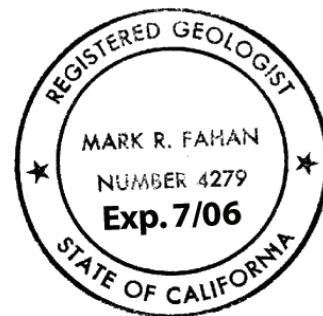
Mark R. Fahan, RG, REA  
Vice President  
Holguin, Fahan & Associates, Inc.

JDA:mrf:bc/krij:mgh/jpk:nd

Enclosures:

- Figure 1 - Site Location Map
- Figure 2 - Site Vicinity Map
- Figure 3 - Plot Plan
- Figure 4 - Geologic Cross-Section A-A'
- Figure 5 - Groundwater Elevation Contour Map for Second Quarter 2005
- Figure 6 - Benzene Concentrations in Groundwater for Second Quarter 2005
- Figure 7 - MTBE/TBA Concentrations in Groundwater for Second Quarter 2005
- Table 1 - Summary of Groundwater Sample Analytical Results
- List of Acronyms
- Attachment 1 - Soil Boring, Direct-Push Sampling, and Well Construction Procedures
- Attachment 2 - Proposed Well Construction Details
- Attachment 3 - Groundwater Monitoring, Sampling, and Sample Management Procedures
- Attachment 4 - Aquifer Test Procedures
- Attachment 5 - Worker Health and Safety Plan

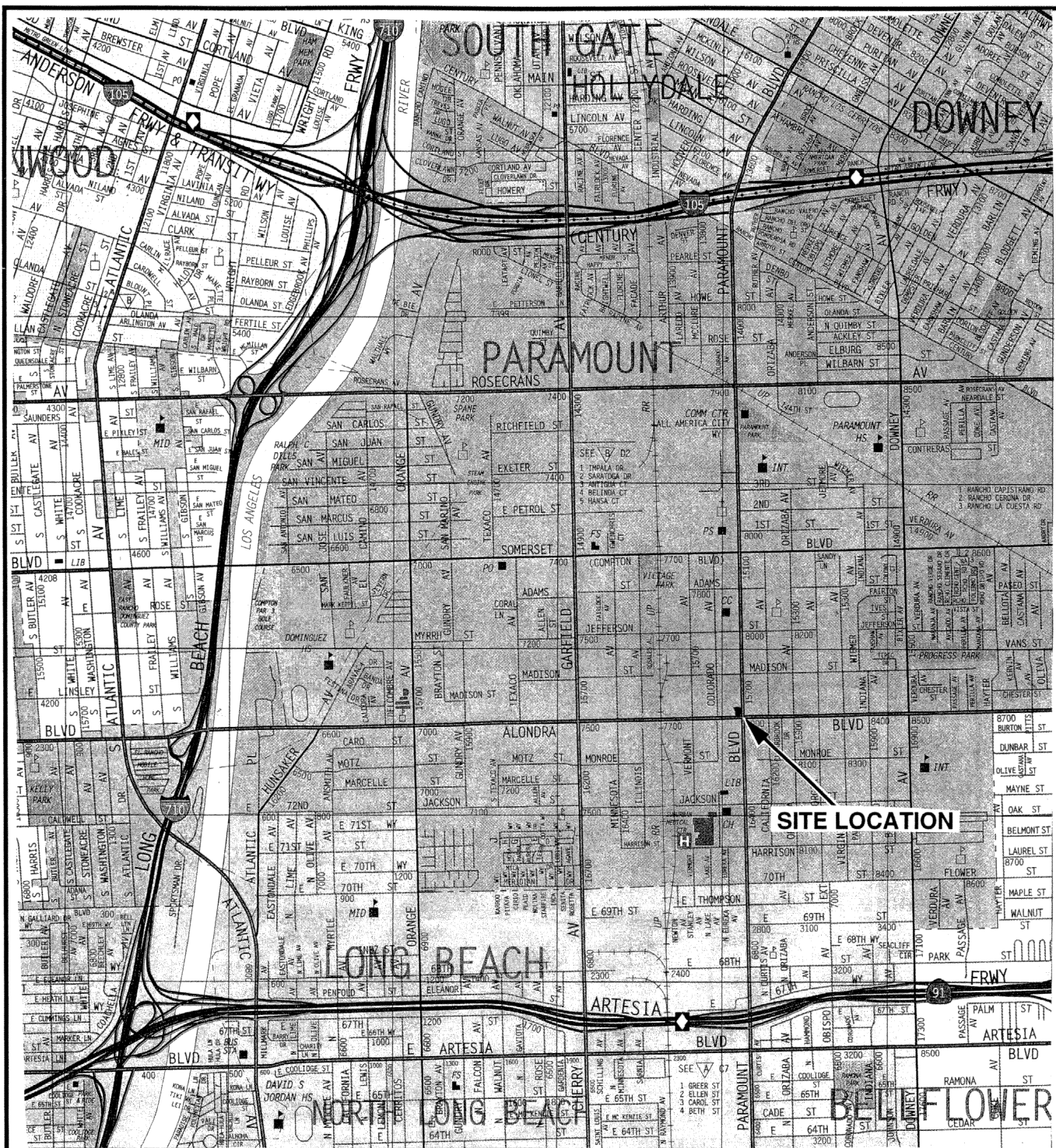
cc: Mr. Gene Ortega, ExxonMobil  
Mr. Nazih Simaan, Property Owner



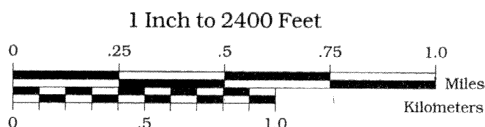


## REFERENCES

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- California Regional Water Quality Control Board, Los Angeles Region (4), 1994, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, June 13, 1994.
- Holguin, Fahan & Associates, Inc., 2003, Site Assessment Report for ExxonMobil Oil Corporation Former Service Station #18-MF0, December 1, 2003.
- Holguin, Fahan & Associates, Inc., 2005a, Site Assessment Report for ExxonMobil Oil Corporation Former Service Station #18-MF0, April 14, 2005.
- Holguin, Fahan & Associates, Inc., 2005b, Second Quarter 2005 Groundwater Monitoring and Progress Report, ExxonMobil Oil Corporation Former Service Station #18-MF0, June 20, 2005.
- Los Angeles County Department of Public Works Hydrologic Records Section, 2002, Information Request Transmittal, February 19, 2002.
- United States Geological Survey, 1967, South Gate Quadrangle 7.5-Minute Series (Topographic), photorevised 1978.



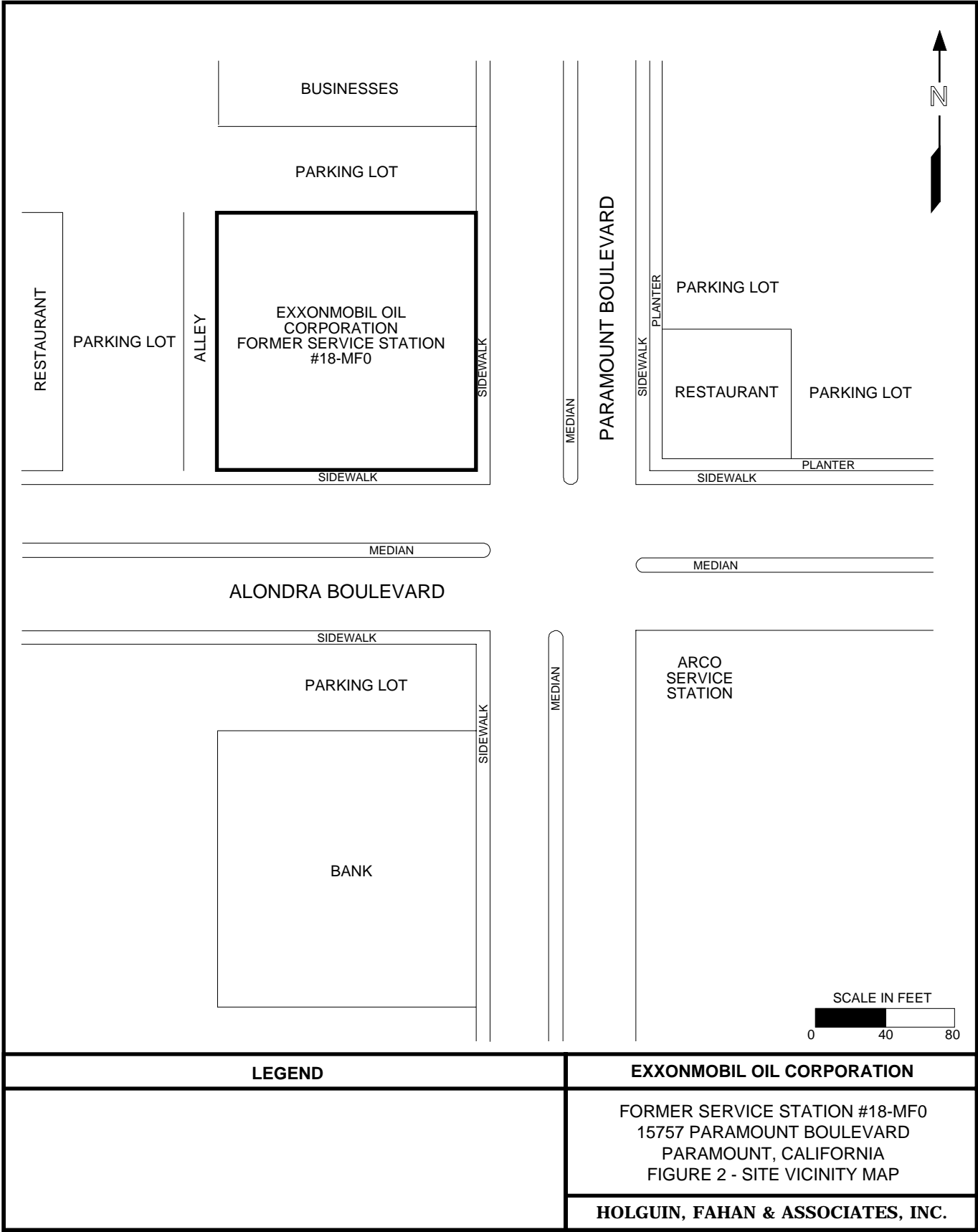
# LEGEND



# EXXONMOBIL OIL CORPORATION

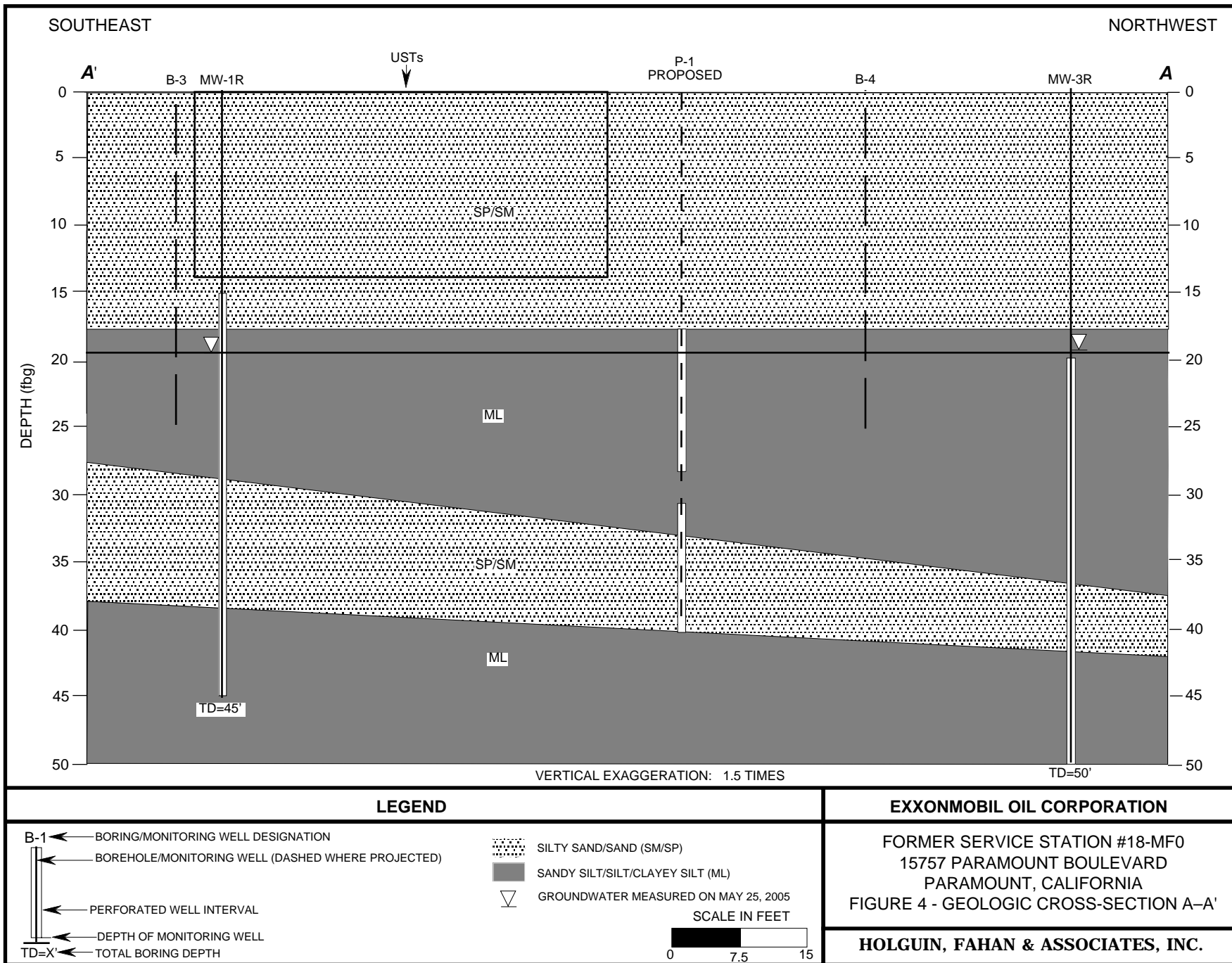
SERVICE STATION #18-MF0  
15757 PARAMOUNT BOULEVARD  
PARAMOUNT, CALIFORNIA  
FIGURE 1 - SITE LOCATION MAP

HOLGUIN, FAHAN & ASSOCIATES, INC.

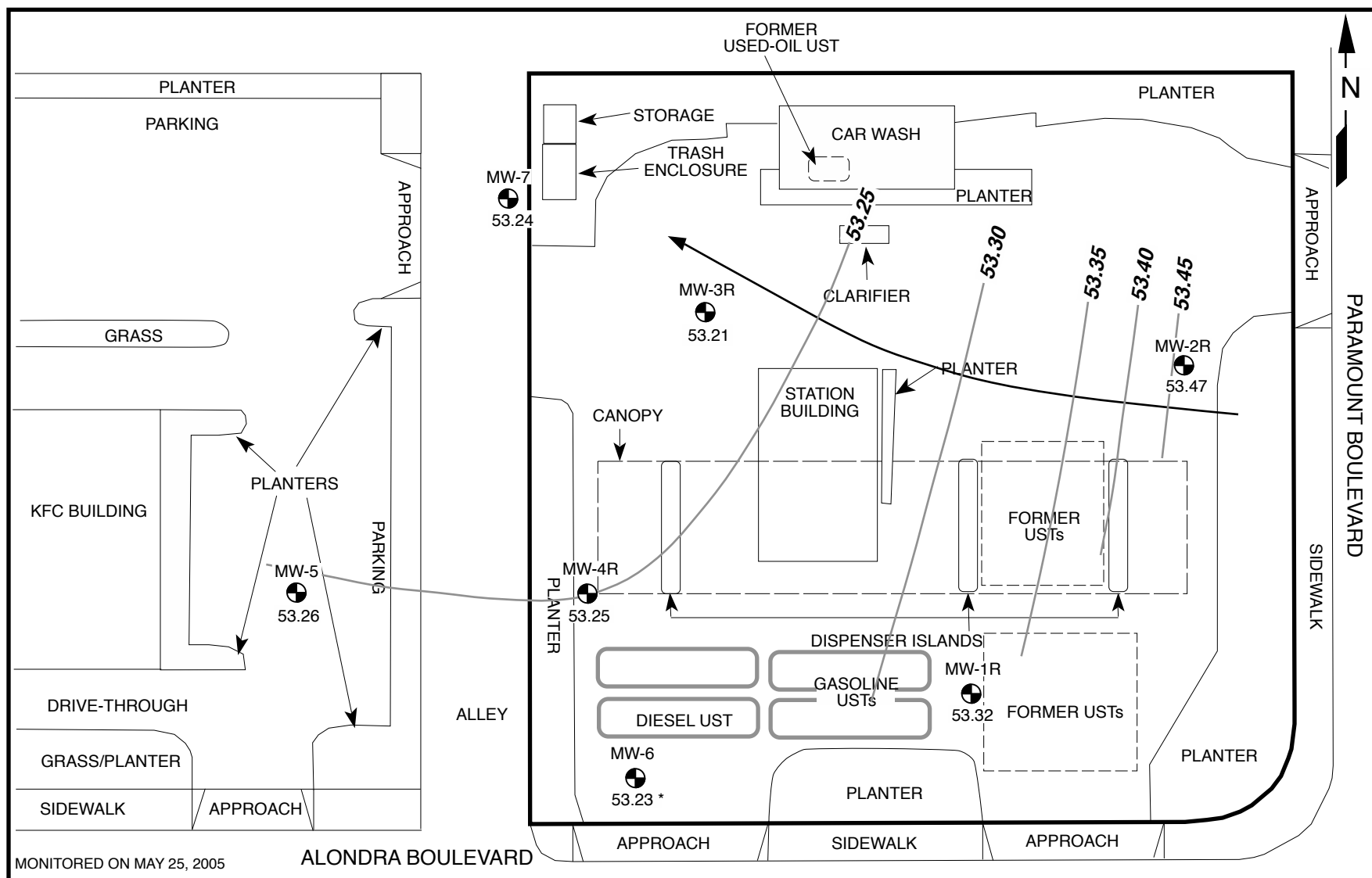







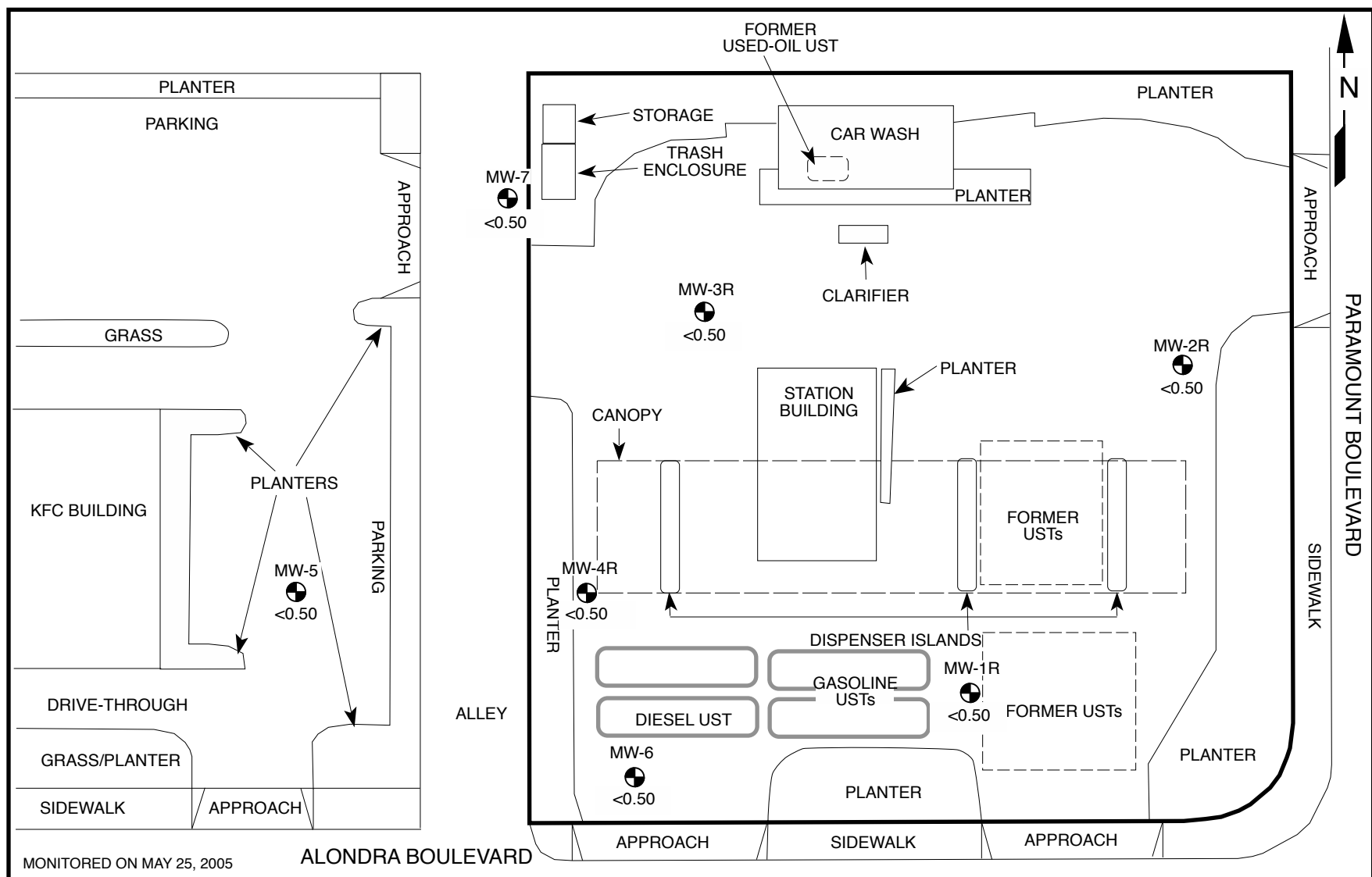







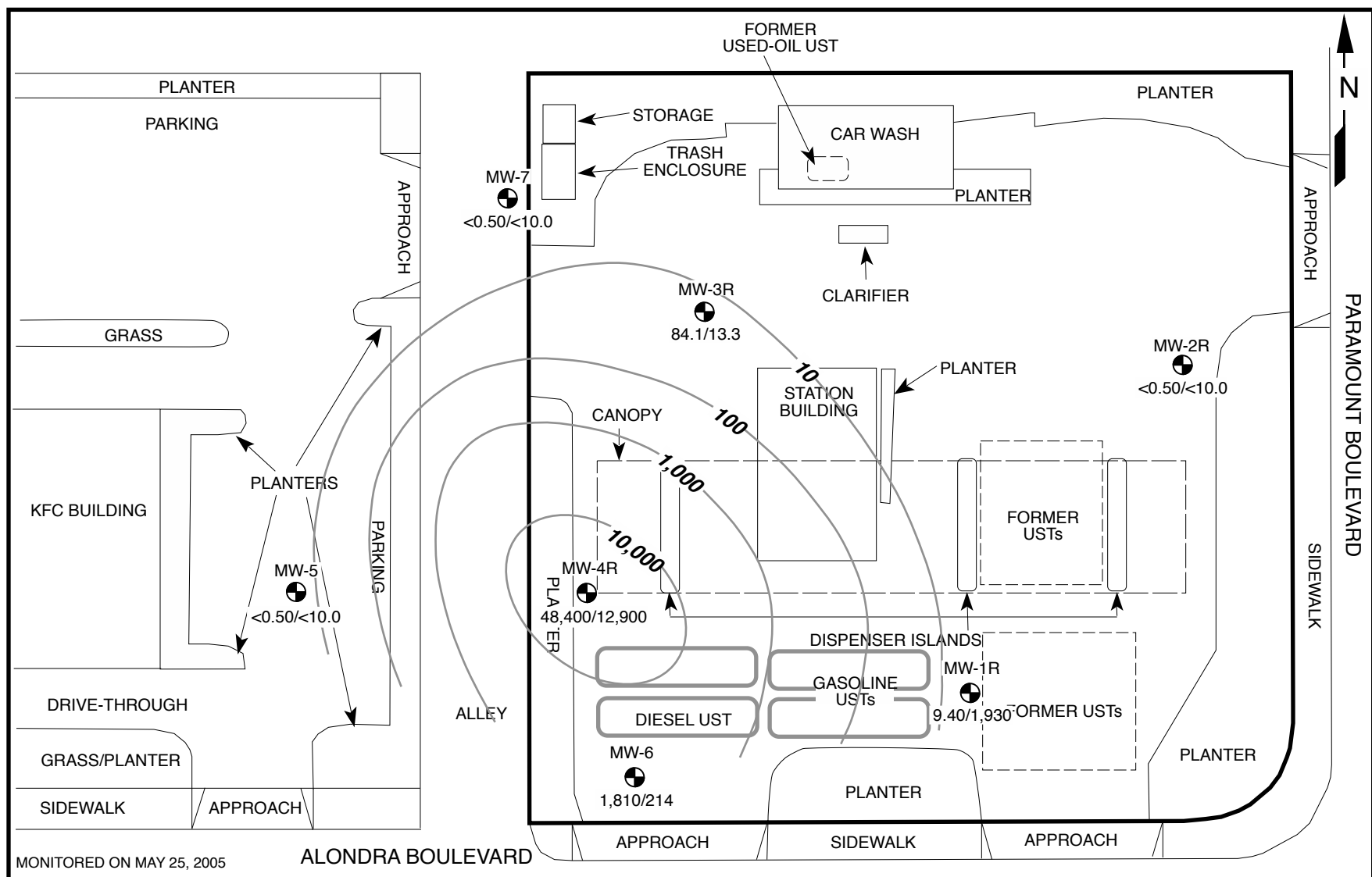
REVISION DATE: SEPTEMBER 12, 2005: KRJ




LEGEND	EXXONMOBIL OIL CORPORATION
<p>  GROUNDWATER MONITORING WELL  # GROUNDWATER ELEVATION (feet above MSL)  <b>53.25</b> - CONTOUR OF GROUNDWATER ELEVATION (feet above MSL)   GROUNDWATER FLOW DIRECTION </p> <p> SCALE IN FEET    0 15 30 </p> <p> * ANOMALOUS DATUM NOT USED FOR CONTOURING </p>	<p> 15757 PARAMOUNT BOULEVARD  PARAMOUNT, CALIFORNIA  FIGURE 5 - GROUNDWATER ELEVATION  CONTOUR MAP FOR SECOND QUARTER 2005 </p> <p> <b>HOLGUIN, FAHAN &amp; ASSOCIATES, INC.</b> </p>



LEGEND		EXXONMOBIL OIL CORPORATION
<p>  GROUNDWATER MONITORING WELL   BENZENE CONCENTRATION IN GROUNDWATER (µg/l) </p>	<p>SCALE IN FEET</p> 	<p>           FORMER SERVICE STATION #18-MF0            15757 PARAMOUNT BOULEVARD            PARAMOUNT, CALIFORNIA            FIGURE 6 - BENZENE CONCENTRATIONS IN            GROUNDWATER FOR SECOND QUARTER 2005 </p>
		<b>HOLGUIN, FAHAN &amp; ASSOCIATES, INC.</b>



LEGEND	EXXONMOBIL OIL CORPORATION
<p>  GROUNDWATER MONITORING WELL            ## MTBE/TBA CONCENTRATIONS IN GROUNDWATER (µg/l)            -10- CONTOUR OF MTBE CONCENTRATIONS IN GROUNDWATER (µg/l)         </p>	<p>           FORMER SERVICE STATION #18-MF0            15757 PARAMOUNT BOULEVARD            PARAMOUNT, CALIFORNIA            FIGURE 7 - MTBE/TBA CONCENTRATIONS IN            GROUNDWATER FOR SECOND QUARTER 2005  <b>HOLGUIN, FAHAN &amp; ASSOCIATES, INC.</b> </p>

**TABLE 1.  
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS  
EXXONMOBIL OIL CORPORATION  
FORMER SERVICE STATION #18-MF0**

Date Measured	Notes	Well Elevation (feet-MSL) (TOC)	Depth To Ground Water(ft-TOC)	PSH Thickness (feet)	Ground Water Elevation (feet-MSL)	TPH AS GAS (µg/l)	TPH AS DIESEL (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylene (µg/l)	MTBE 8020-8021 (µg/l)	MTBE 8260 (µg/l)	TBA (µg/l)	DIPE (µg/l)	ETBE (µg/l)	TAME (µg/l)	Ethanol (µg/l)	Methanol (µg/l)	EDB (µg/l)	EDC (µg/l)	Lead (µg/l)
EPA ANALYTICAL METHOD						REFER TO ATTACHED LABORATORY REPORTS FOR THE CURRENT QUARTER																
MINIMUM DETECTION LIMIT						REFER TO ATTACHED LABORATORY REPORTS FOR THE CURRENT QUARTER																
MW-1R																						
SCREEN INTERVAL (ftg): 15 to 45																						
10-24-2003		71.48	19.52	0	51.96	4,670	--	<0.50	<0.50	<0.50	<0.50	--	9,850	603	<0.50	<0.50	8.10	--	--	--	--	--
01-20-2004		71.48	20.25	0	51.23	2,810	--	<0.50	<0.50	<0.50	<0.50	--	3,890	147	<0.50	<0.50	3.60	<100	--	--	--	--
04-22-2004		71.48	20.11	0	51.37	615	<50	<0.50	<0.50	<0.50	<0.50	--	2,440	1,720	<0.50	<0.50	1.40	<100	--	--	--	--
08-04-2004		71.48	21.60	0	49.88	872	--	<0.50	<0.50	<0.50	<0.50	--	925	3,850	<0.50	<0.50	0.70	<100	--	--	--	--
11-04-2004		71.48	21.79	0	49.69	117	--	<0.50	<0.50	<0.50	<0.50	--	116	6,720	<0.50	<0.50	<0.50	<100	--	--	--	--
02-25-2005		71.48	20.30	0	51.18	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	26.1	981	<0.50	<0.50	<0.50	<100	--	--	--	--
05-25-2005		71.48	18.16	0	53.32	88.1	--	<0.50	<0.50	<0.50	<0.50	--	9.40	1,930	<0.50	<0.50	<0.50	<100	--	--	--	--
MW-2R																						
SCREEN INTERVAL (ftg): 15 to 45																						
10-24-2003		71.48	19.67	0	51.81	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	4.50	<10.0	<0.50	<0.50	<0.50	--	--	--	--	--
01-20-2004		71.48	20.26	0	51.22	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	0.60	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
04-22-2004		71.48	20.10	0	51.38	<50.0	<50	<0.50	<0.50	<0.50	<0.50	--	30.9	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
08-04-2004		71.48	21.63	0	49.85	56.5	--	<0.50	<0.50	<0.50	<0.50	--	81.7	7.80J	<0.50	<0.50	<0.50	<100	--	--	--	--
11-04-2004		71.48	21.68	0	49.80	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	33.3	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
02-25-2005		71.48	19.05	0	52.43	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	14.6	39.1	<0.50	<0.50	<0.50	<100	--	--	--	--
05-25-2005		71.48	18.01	0	53.47	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
MW-3R																						
SCREEN INTERVAL (ftg): 20 to 50																						
10-24-2003		71.55	19.69	0	51.86	<50.0	--	0.40J	<0.50	<0.50	<0.50	--	9.70	<10.0	<0.50	<0.50	<0.50	--	--	--	--	--
01-20-2004		71.55	20.43	0	51.12	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	12.2	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
04-22-2004		71.55	20.22	0	51.33	<50.0	<50	<0.50	<0.50	<0.50	<0.50	--	18.4	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
08-04-2004		71.55	21.00	0	50.55	54.4	--	<0.50	<0.50	<0.50	<0.50	--	66.1	10.5	<0.50	<0.50	<0.50	<100	--	--	--	--
11-04-2004		71.55	22.17	0	49.38	113	--	<0.50	<0.50	<0.50	<0.50	--	114	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--
02-25-2005		71.55	19.29	0	52.26	150	--	<0.50	<0.50	<0.50	<0.50	--	184	25.9	<0.50	<0.50	<0.50	<100	--	--	--	--
05-25-2005		71.55	18.34	0	53.21	71.8	--	<0.50	<0.50	<0.50	<0.50	--	84.1	13.3	<0.50	<0.50	<0.50	<100	--	--	--	--
MW-4R																						
SCREEN INTERVAL (ftg): 15 to 45																						
10-24-2003		71.60	19.90	0	51.70	5,700	--	<0.50	<0.50	<0.50	<0.50	--	17,600	1,160	<0.50	<0.50	5.20	--	--	--	--	--
01-20-2004		71.60	20.45	0	51.15	20,400	--	<0.50	<0.50	<0.50	<0.50	--	20,800	2,000	<0.50	<0.50	8.30	<100	--	--	--	--
04-22-2004		71.60	20.31	0	51.29	8,100	<50	<0.50	<0.50	<0.50	<0.50	--	27,600	12,100	<0.50	<0.50	10.6	<100	--	--	--	--
08-04-2004		71.60	22.15	0	49.45	31,500	--	<0.50	<0.50	0.40J	0.80	--	32,800	10,100	<0.50	0.80	13.1	<100	--	--	--	--
11-04-2004		71.60	21.94	0	49.66	36,400	--	<0.50	<0.50	<0.50	<0.50	--	36,800	10,600	<0.50	<0.50	12.6	<100	--	--	--	--

**TABLE 1.  
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS  
EXXONMOBIL OIL CORPORATION  
FORMER SERVICE STATION #18-MF0**

Date Measured	Notes	Well Elevation (feet-MSL) (TOC)	Depth To Ground Water(ft-TOC)	PSH Thickness (feet)	Ground Water Elevation (feet-MSL)	TPH AS GAS (µg/l)	TPH AS DIESEL (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl- benzene (µg/l)	Total Xylene (µg/l)	MTBE 8020-8021 (µg/l)	MTBE 8260 (µg/l)	TBA (µg/l)	DIPE (µg/l)	ETBE (µg/l)	TAME (µg/l)	Ethanol (µg/l)	Methanol (µg/l)	EDB (µg/l)	EDC (µg/l)	Lead (µg/l)	
EPA ANALYTICAL METHOD						REFER TO ATTACHED LABORATORY REPORTS FOR THE CURRENT QUARTER																	
MINIMUM DETECTION LIMIT						REFER TO ATTACHED LABORATORY REPORTS FOR THE CURRENT QUARTER																	
02-25-2005		71.60	19.27	0	52.33	34,000	--	<0.50	<0.50	<0.50	<0.50	--	41,800	23,100	<0.50	1.10	16.6	<100	--	--	--	--	
05-25-2005		71.60	18.35	0	53.25	35,900	--	<0.50	<0.50	<0.50	<0.50	--	48,400	12,900	<0.50	<0.50	22.9	<100	--	--	--	--	
MW-5																							
SCREEN INTERVAL (ftg): 10 to 40																							
02-25-2005		71.46	19.08	0	52.38	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
05-25-2005		71.46	18.20	0	53.26	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
MW-6																							
SCREEN INTERVAL (ftg): 10 to 40																							
02-25-2005		71.23	18.85	0	52.38	13,500	--	<0.50	<0.50	<0.50	<0.50	--	16,000	3,140	<0.50	<0.50	5.20	<100	--	--	--	--	
05-25-2005		71.23	18.00	0	53.23	1,230	--	<0.50	<0.50	<0.50	<0.50	--	1,810	214	<0.50	<0.50	4.30	<100	--	--	--	--	
MW-7																							
SCREEN INTERVAL (ftg): 10 to 40																							
02-25-2005		70.32	18.05	0	52.27	86.4	--	<0.50	<0.50	<0.50	<0.50	--	110	13.3	<0.50	<0.50	<0.50	<100	--	--	--	--	
05-25-2005		70.32	17.08	0	53.24	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
TRIP BLANK																							
SCREEN INTERVAL (ftg): N/A to N/A																							
10-24-2003		N/A	N/A	N/A	N/A	<50.0	--	<0.50	0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	--	--	--	--	--	
01-20-2004		N/A	N/A	N/A	N/A	<50.0	--	<0.50	0.30J	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
04-22-2004		N/A	N/A	N/A	N/A	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
08-04-2004		N/A	N/A	N/A	N/A	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
11-04-2004		N/A	N/A	N/A	N/A	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
02-25-2005		N/A	N/A	N/A	N/A	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	
05-25-2005		N/A	N/A	N/A	N/A	<50.0	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<10.0	<0.50	<0.50	<0.50	<100	--	--	--	--	

-- = not sampled or not analyzed. <# = not detected at reporting level indicated.

## LIST OF ACRONYMS

AB2886	California State Assembly Bill 2886
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CDWR	California Department of Water Resources
CRWQCB-LAR	California Regional Water Quality Control Board, Los Angeles Region (4)
DIPE	diisopropyl ether
DOT	Department of Transportation
EDB	ethylene dibromide
EDC	ethylene dichloride or 1,2-dichloroethane
EPA	Environmental Protection Agency
ETBE	ethyl tertiary butyl ether
fbg	feet below grade
feet-MSL	feet above mean sea level
FID	flame ionization detector
ft-TOC	feet below top of casing
GC	gas chromatograph
ID	identification
J	value between the method detection limit and the repeating limit
LACDPW	Los Angeles County Department of Public Works
LUFT	leaking underground fuel tank
MCL	maximum contaminant level
MSL	mean sea level
MTBE	methyl tertiary butyl ether
N/A	not applicable
No.	number
OD	outside diameter
PSH	phase-separated hydrocarbons
PVC	polyvinyl chloride
SWRCB	State Water Resources Control Board
TAME	tertiary amyl methyl ether
TBA	tertiary butyl alcohol
TD	total boring depth
TOC	top of casing
TPH	total petroleum hydrocarbons
USGS	United States Geological Survey
UST	underground storage tank
µg/l	micrograms per liter



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## **ATTACHMENT 1.**

### **SOIL BORING, DIRECT-PUSH SAMPLING, AND WELL CONSTRUCTION PROCEDURES**



## **SOIL BORING, DIRECT-PUSH SAMPLING, AND WELL CONSTRUCTION PROCEDURES**

### **PRE-DRILLING PROTOCOL**

#### **Planning**

Prior to the start of drilling, necessary permits, site access agreements, and/or encroachment permits are obtained. As-built drawings are obtained if possible. At least 2 weeks in advance of drilling, notifications are made to the property owner, client representative, on-site facility manager, regulatory agency, and/or other appropriate parties. At least 48 hours prior to drilling, Underground Service Alert of Southern California, Arizona Blue Stake, or an equivalent utility locating service is notified. A geophysical survey may be conducted to locate subsurface utilities. Site plans and/or as-built drawings are compared to actual conditions observed at the site. The property owner/retailer is interviewed to gain information about locations of former UST systems (including dispensers, product lines, and vent lines). A visual inspection is made of the locations of the existing UST system, and scars and patches in pavement are noted. The critical zone, which is defined as 10 feet from any part of the UST system as well as the area between the dispensers and USTs, is identified, and any proposed drilling locations within the critical zone may be subject to special hole clearance techniques. Drilling locations within the critical zone are avoided if possible.

A site-specific, worker health and safety plan, including a JSA and traffic control plan for all soil sampling locations for the site, is available at all times during drilling activities. Prior to commencing field activities, a health and safety meeting is held among all on-site personnel involved in the operations, including subcontractors and visitors, and is documented with a health and safety meeting sign-in form. The emergency shut-off switch for the service station is located prior to the start of the drilling activities. A fire extinguisher and "No Smoking" signs (and Proposition 65 signs in California) are present at the site prior to the start of the drilling activities.

In order to determine the natural subsurface conditions, better recognize fill conditions, and prevent cross contamination, the first sampling location is generally located the furthest from any suspected underground improvement.

When drilling a soil boring in asphalt or concrete, a minimum 10-inch round cut is made. When advancing a direct-push location, a minimum 3.5-inch round cut is made.

### **Hole Clearance**

The minimum hole clearance depths are 5 feet below grade (fbg) outside the critical zone and 8 fbg within the critical zone and are conducted as follows:

- 0 to 5 fbg: The area to be cleared exceeds the diameter of the largest tool to be advanced and is large enough to allow for visual inspection of any obstructions encountered. The first 1 to 2 feet of soil or fill is removed by hand digging, then the borehole is probed using a blunt-tipped tool to ensure that no obstructions exist anywhere near the potential path of the drill auger or push-type sampler. Probing is extended laterally as far as possible. Hand augering or post-hole digging then proceeds, but only to the depth that has been probed. If subsurface characteristics prohibit effective probing, a hand auger is carefully advanced past the point of probing. In this case, sufficient hand augering or post-hole digging is performed to remove all the soil in the area to be delineated. For soil borings located outside of the critical zone, an attempt should be made to probe an additional 3 feet.
- 5 to 8 fbg: For the soil borings located inside the critical zone, probing and handclearing an additional 3 feet is performed. If probing is met with refusal, then trained personnel advance a hand auger without excessive force.

Alternate or additional subsurface clearance procedures may also be employed, as required by clients, permit conditions, and/or anticipated subsurface conditions (for example, near major utility corridors or in hard soils). Alternate clearance techniques may include performing a geophysical investigation or using an air knife or water knife. If subsurface conditions prevent adequate subsurface clearance, the field activities cease until the client gives written approval of a procedure for continuation.

When pea gravel, fill sand, or other non-indigenous material is encountered, the sampling location is abandoned unless the absence of subsurface facilities can be demonstrated and client approval to proceed is obtained. If hole clearance activities are conducted prior to the actual day of drilling, the holes are covered with plates and/or backfilled.

If any portion of the UST system is encountered, or if there is any possibility that it has been encountered, the work ceases, and the client is notified immediately. If there is reason to believe that the product system has been damaged, the emergency shut-off switch is activated. The client will decide if additional uncovering by hand is required. If it is confirmed that the UST system has been encountered, tightness tests are performed as required by the client. The hole is backfilled only with client approval.

## **SOIL SAMPLING PROCEDURES**

Soil samples are collected using one of the following methods:

- Manual drilling: Manual drilling utilizes a hand auger. Soil samples are collected with a drive sampler outfitted with steel or brass sleeves. The specific equipment used is noted on a log of exploratory boring.
- Truck-mounted, powered drilling: Truck-mounted, powered drilling utilizes hollow-stem flight auger drilling, air rotary drilling, percussion hammer drilling, or similar technologies. Soil samples are collected in steel or brass sleeves with a California-modified, split-spoon sampler or, for specific projects, a continuous sampler. The specific equipment used is noted on a log of exploratory boring.
- Direct push sampling: Direct push sampling utilizes Geoprobos, cone penetrometer testing rigs, or similar technologies. Soil samples are collected with a drive sampler outfitted with steel, acetate or brass sleeves. The specific equipment used is noted on a log of soil sample descriptions.

Before each soil sampling episode, the sampling equipment is decontaminated using a non-phosphate soap and water wash, and two tap-water rinses. The drill augers or direct-push rods are decontaminated with a steam cleaner between each soil boring (truck-mounted rigs).

Soil samples that are collected in sample sleeves are covered with aluminum foil or Teflon tape followed by plastic caps. If EPA Method 5035 is required, then 5 to 20 grams of soil is extracted from the sample and placed in methanol-preserved containers supplied by the laboratory, or subsamples are collected using Encore samplers. During the sampling process, soil samples and cuttings are field screened for VOCs using a photoionization detector calibrated to an isobutylene or hexane standard. The calibration information is recorded on an equipment calibration log. Any soil staining or discoloration is visually identified. Soils are classified according to the Unified Soil Classification System. Specific geologic and hydrogeologic information collected includes grading, plasticity, density, stiffness, mineral composition, moisture content, soil structure, grain size, degree of rounding, and other features that could affect contaminant transport. All data are recorded on a soil boring log under the supervision of a geologist registered in the state in which the site is located. The samples are labeled, sealed, recorded on a chain-of-custody record, and chilled to 4°C in accordance with the procedures outlined in the California State Water Resources Control Board's Leaking Underground Fuel Tank Field Manual or the Arizona Department of Environmental Quality's (ADEQ's) Leaking Underground Storage Tank Site Characterization Manual. Sample preservation, handling, and transportation procedures are consistent with Holguin, Fahan & Associates, Inc.'s quality assurance/quality control procedures. The samples are transported in a chilled container to a state-certified, hazardous waste testing laboratory.

Cuttings from the soil borings are stored in 55-gallon, Department of Transportation (DOT) approved drums, roll-off bins, or other appropriate containers, as approved by the client. Each container is labeled as waste material or non-hazardous waste, with the number of the soil boring(s) from which the waste was derived, the date the waste was generated, the generator name, and other pertinent information. The drums are stored at the site of generation, or at another location approved by the client until sample laboratory analytical results are obtained, at which time the soil is disposed of appropriately.

A soil boring log is completed for each soil sampling location and includes the following minimum information:

- date of drilling;
- project name and location;
- soil sample names and depths;
- soil descriptions and classifications;
- standard penetration counts (rigs);
- photoionization detector readings;
- drilling equipment;
- soil boring diameter;
- sampling equipment;
- depth to groundwater in soil boring;
- name of person performing logging;
- name of supervising registered geologist; and
- name of drilling company (rigs and direct push).

#### **HYDROPUNCH GROUNDWATER SAMPLING PROCEDURES**

Hydropunch sampling of groundwater is designed for collecting discrete, one-time samples of groundwater for analysis during the drilling or direct-push operations. The Hydropunch sampler consists of a 5-foot long, 1.5-inch diameter screen sheathed by a 2-inch diameter, steel barrel. A disposable point is connected to the bottom of the screen. The Hydropunch assembly is lowered through the hollow-stem auger and driven into the undisturbed soils below the base of the hole, or is pushed into the soil using a direct push rig. The outer sheath is then retracted to expose the screen. A bailer is then lowered into the Hydropunch assembly and retrieves a sample of the groundwater within the assembly.

The extracted groundwater is collected in chilled, 40-milliliter, volatile organic analysis vials having Teflon-lined caps, or other appropriate containers as required by the respective analytical method. For organic compound analyses, hydrochloric acid preservative is added to all containers by the laboratory to lower sample pH. Samples are held at 4°C while in the field

and in transit to the laboratory. Analysis is performed by a state-certified, hazardous waste testing laboratory.

Documentation requirements include:

- sample identification number;
- borehole identification number;
- time and date of sample collection;
- depth at which Hydropunch sample was collected;
- name of person collecting sample;
- number and types of sample containers; and
- type of preservative used, if any.

## **BOREHOLE COMPLETION PROCEDURES**

All sampling locations are either properly abandoned or completed as a well.

### **Abandonment**

Each borehole/sample location that is not completed as a well is backfilled with bentonite grout, neat cement, concrete, or bentonite chips with a permeability less than that of the surrounding soils, and/or soil cuttings, depending on local regulatory requirements or client instructions. Grout is placed by the tremie method. Backfilling is performed carefully to avoid bridging. The type of backfill material is noted on the log.

### **Well Installation**

Wells are designed according to applicable state and local regulations as well as project needs. Details of the well design and construction are recorded on the log and include the following minimum information (in addition to the items noted above for soil borings):

- detailed drawing of well;
- type of well (groundwater, vadose, or air sparging);
- casing diameter and material;
- screen slot size;
- well depth and screen length ( $\pm 1$  foot);
- filter pack material, size, and placement depths;
- annular seal material and placement depths; and
- surface seal design/construction.

Groundwater monitoring wells are generally designed with 30 feet of slotted casing that crosses the water table, unless site conditions, project needs, or local regulations dictate a different well design. Vadose wells are designed with slotted casing appropriate for the project needs, e.g.

slotted in hydrocarbon-containing intervals for vapor extraction. Air sparging wells are typically designed with 5 feet of slotted casing placed 15 feet below the water table. The sand pack is placed at least two feet above the top of the screen, and at least 3 feet of low permeability seal material is placed between the sand pack and the surface seal, unless shallow groundwater conditions exist (less than 5 fbg). The sand pack and low permeability seal material are placed in the annular space from the bottom up using the tremie method.

When drilling in asphalt, a 24-inch round cut is made for the well pad. When drilling on concrete, a 2 x 2-foot square or 24-inch circle is sawcut. The well cover is traffic-rated and has a white lid with a black triangle painted on it (3 inches per side) or a black lid with a white triangle (3 inches per side). The well pad is completed using concrete of a color matching the existing surface. The well number is labeled on the outside of the well box/pad and the inside of the well box. The number on the outside is painted on with a stencil, stamped, or attached to the well with a metal plate. The number on the inside is written on the well cap with waterproof ink. The casing has a notch or indication on its north side indicating a unique measuring/surveying point. Well casings are capped with a locking or slip well cap.

### **Well Development**

Well development is conducted by the use of surge blocks, bailers, pumps, or other appropriate methods in accordance with the requirements of the California Department of Water Resources Bulletin #74-81 dated December 1981, or ASTM International 4448-85a (as required by the ADEQ). Only formation water is used for surging the well. Well development continues until non-turbid groundwater is produced or turbidity stabilizes. The method of development and the volume of groundwater produced is recorded in the field log. All purged groundwater is held on-site, or at another location approved by the client, in sealed, 55-gallon DOT approved drums or other appropriate containers pending transport to an approved recycling facility.

### **Well Elevation Survey**

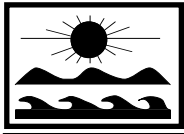
The elevation of the north side of the top of well casing (or other appropriate reference point from which the depth to groundwater can be measured) is surveyed to an accuracy of  $\pm 0.01$  foot. All measurements are reproduced to assure validity. Surveying may be performed by a state-licensed surveyor if required by state or local regulations. In the state of California, wells are surveyed in accordance with AB2886.

## **DATA REDUCTION**

The data compiled from the soil borings are summarized and analyzed. A narrative summary of the soil characteristics is also presented. The logs are checked for the following information:

- correlation of stratigraphic units among sampling locations;
- identification of zones of potentially high hydraulic conductivity;
- identification of the confining layer;
- indication of unusual/unpredicted geologic features (fault zones, fracture traces, facies changes, solution channels, buried stream deposits, cross-cutting structures, pinchout zones, etc.); and
- continuity of petrographic features such as sorting, grain-size distribution, cementation, etc.

Soil boring/well locations are plotted on a properly scaled map. If appropriate, soil stratigraphy of the site is presented in a scaled cross section. Specific features that may impact contaminant migration, e.g., fault zones or impermeable layers, are discussed in narrative form and supplemented with graphical presentations as deemed appropriate.



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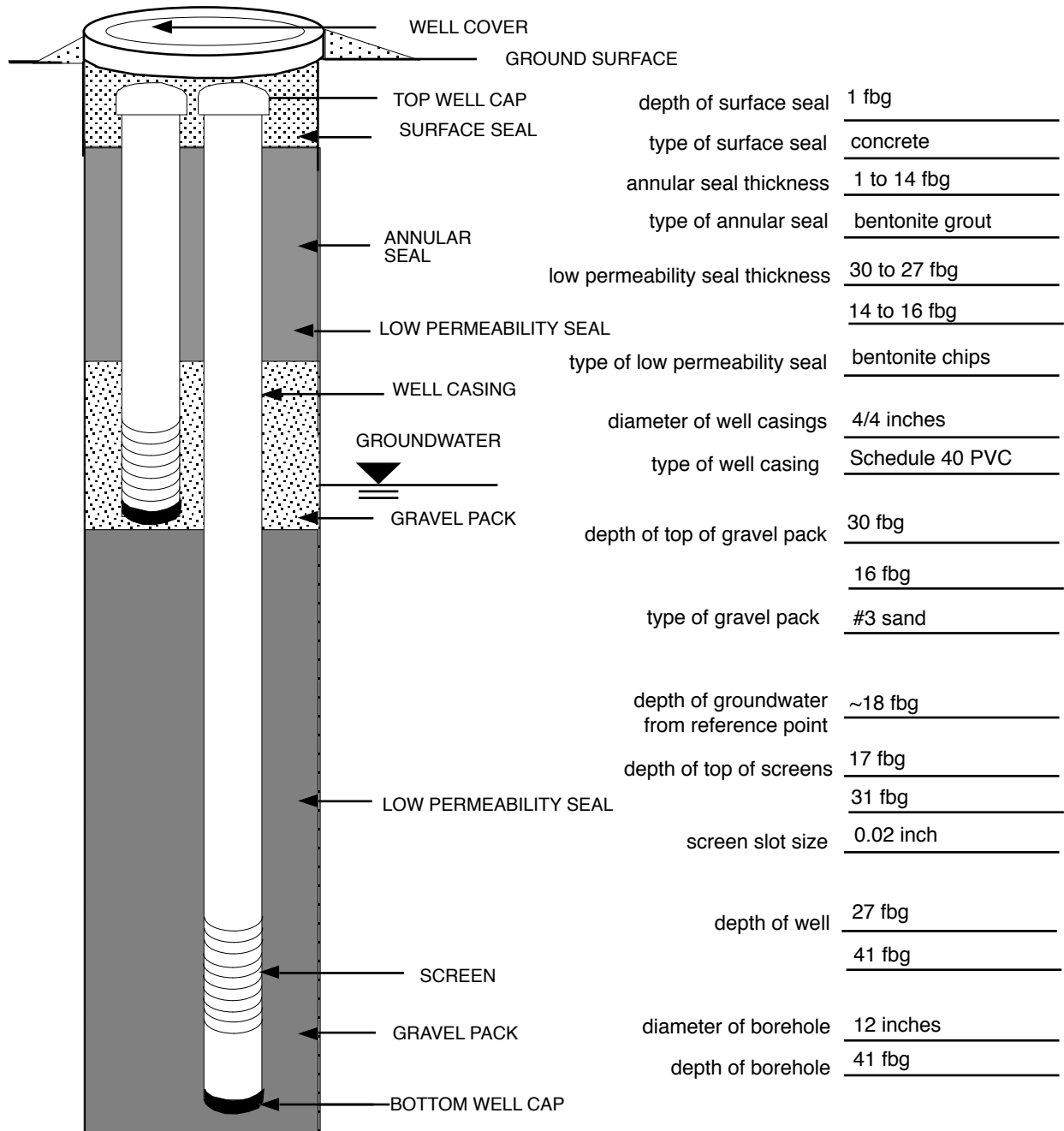
## **ATTACHMENT 2.**

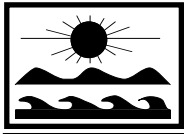
### **PROPOSED WELL CONSTRUCTION DETAILS**



## PROPOSED WELL CONSTRUCTION DETAILS

Client Name	EXXONMOBIL OIL CORPORATION	Well No. <u>P-1</u>
Project Name	FORMER SERVICE STATION #18-MF0	
Site Address	15757 PARAMOUNT BOULEVARD	
	PARAMOUNT, CALIFORNIA	
Supervised by	JAMES ANDERSON, REA	





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### **ATTACHMENT 3.**

### **GROUNDWATER MONITORING, SAMPLING, AND SAMPLE MANAGEMENT PROCEDURES**

## **GROUNDWATER MONITORING, SAMPLING, AND SAMPLE MANAGEMENT PROCEDURES**

### **NOTIFICATIONS**

Prior to performing any field work, the client, regulatory agency, and property owner/manager with jurisdiction over the subject site are notified. Notifications are made a minimum of 48 hours prior to sampling, or as required by the client or regulator. E-mail notifications are used whenever possible.

### **WATER LEVEL MEASUREMENTS**

Prior to performing purge or no-purge sampling, water level measurements are collected according to the following procedures.

- All wells are checked for phase-separated hydrocarbons (PSH) with a clear plastic or Teflon bailer or oil/water interface meter.
- To avoid cross contamination, water levels are measured starting with the historically "cleanest" wells and proceeding to the historically "dirtiest."
- Water levels within each well are measured to an accuracy of  $\pm 0.01$  foot using an electronic measuring device and are referenced to the surveyed datum (well cover or top of casing). When measuring to top of casing, measurements are made to the notched (or otherwise marked) point on the casing. If no marking is visible, the measurement is made to the northern side of the casing. Measurements include the depth to groundwater, depth to PSH if applicable, and depth to bottom of well.
- If possible, all wells are gauged within a short time interval on the same day to obtain accurate measurements of the potentiometric surface.
- All measurements are reproduced to assure validity, and measuring equipment is decontaminated between wells.

### **PHASE-SEPARATED HYDROCARBONS**

If PSH is encountered, its thickness and depth are measured using one of the following methods.

- An electronic oil/water interface meter is used to measure the depths to the top of the PSH and to the top of the water; and/or

- An electronic water level meter is used to measure the depth to the top of the water and a clear bailer is used to measure the PSH thickness.

The potentiometric surface elevation is calculated as:

$$\text{TOC} - \text{DTW} + 0.74\text{PT}$$

Where TOC = top-of-casing elevation, DTW = depth to water (interface), and PT = PSH thickness.

If PSH thickness is less than 0.02 foot, and purging of the well is planned prior to sample collection, the well is purged and sampled in accordance with the sample collection section of this standard operating procedure (SOP). If the PSH thickness is 0.02 foot or greater, the PSH is bailed from the well, and left on-site in a labeled and sealed container. Generally, no sample is collected for analysis from wells having a PSH thickness of greater than 0.02 foot. If a groundwater sample is collected to meet technical or regulatory objectives for the project, the sample is collected from the bottom of a disposable bailer lowered below the PSH-water interface. Wells containing PSH should not be purged, even if the other wells are purged.

#### **NO-PURGE SAMPLING**

Well purging is not conducted prior to sampling if purging is not needed to meet technical and/or regulatory project requirements. Following collection of water level measurements, the wells are sampled according to the protocol in the sample collection section of this document.

#### **PURGING PROCEDURES**

Well purging is conducted prior to sampling if purging is needed to meet technical and/or regulatory project requirements. Well purging may be performed using any of the following methodologies: dedicated pump, peristaltic pump with dedicated stinger, vacuum truck with dedicated stinger, electric submersible pump, bailer, bladder pump, or hand pump. The goal of purging wells is to remove stagnant water from the well and allow formation water to enter the well to be collected for analysis. If the wells are completed in low-yielding formations and are pumped dry, the purging may be discontinued. Purge rates should be low enough to prevent excessive agitation and/or prevent water from cascading into the well.

#### **Dedicated Pump Purging**

If permanent pumps are installed in the wells for groundwater remediation, the pumps are operated for at least 24 hours prior to sampling. If a dedicated sampling port is in place to collect samples of the pumped water from an individual well, then the port is used to collect the

sample. VOA vials are filled completely so that no headspace or air bubbles are present within the vial. Care is taken to minimize air exposure and turbulence. The vials are not overfilled, which could cause preservative to be lost. If no sampling port is in place, the pump is turned off and the wells are sampled according to the protocol in the sample collection section of this document.

### **Purging Methods**

If dedicated pumps are not present at the site, then purging is accomplished by either standard purging or low-flow purging (also known as “micropurging”).

#### Standard Purging

Standard purging methods involve removal of a set number of casing volumes of water and/or removal of sufficient water to stabilize indicator parameters such as temperature, pH, and conductivity (see below for measurement procedures). The water is removed using a vacuum or peristaltic pump, submersible electric pump, bailer, hand pump, or bladder pump, as appropriate for the site conditions. The specific purging method and equipment are recorded in the field log. A surge block may be used if the well screen becomes bridged with sediment or the produced groundwater is overly turbid.

#### Low-Flow Purging

Low-flow purging involves purging at sufficiently low rates of withdrawal that drawdown, aeration, and turbulence are minimal. Groundwater is removed using a submersible pump, bladder pump, or centrifugal pump. Water is purged from the well at flow rates that are generally in the range of 0.05 to 0.5 gallons per minute, but this may be lower or higher in wells of lower or higher productivity.

The pump intake is positioned in the mid-point of the saturated screened interval, but a different position may be used based on hydrogeologic conditions and/or analyte properties. For petroleum hydrocarbon and oxygenate sample analysis, the pump intake is placed in the upper third of the saturated screened interval. The type of pump, flow rate, total volume of water removed, and depth of the pump intake are noted on the field log. Low-flow purging continues until temperature, pH, and conductivity stabilize (see below for measurement procedures). Then, a water sample is collected from the purge water effluent stream or from a bailer. VOA vials are filled completely so that no headspace or air bubbles are present within the vial. Care is taken to minimize air exposure and turbulence. The vials are not overfilled, which could cause preservative to be lost.

### **Monitoring During Purging**

During the purging process, groundwater is monitored for temperature, pH, and conductivity using a standard field meter. Dissolved oxygen, turbidity, and other parameters may be collected for project-specific needs. These water quality parameters are recorded on a field log. Purging continues until a minimum number of well volumes (3) are removed and/or temperature, pH, and conductivity stabilize. For standard purging, water quality parameters are measured in bailer samples or from the pump effluent. For low-flow purging, water quality parameters are continuously monitored during purging using a water quality meter housed within a Solinst flow-through cell, and stabilization generally occurs after about one casing volume is purged from a well.

### **Purge Water Storage and Disposal**

If active groundwater treatment is occurring at the site, purge water may be disposed of through the treatment system. Otherwise, purge water is either stored on-site in Department of Transportation-approved 55-gallon drums, or transported offsite as non-hazardous waste for disposal or recycling at an approved facility.

### **SAMPLE COLLECTION PROCEDURES**

For dedicated pumps with sampling ports and for low-flow purging, samples are collected directly from the purge water stream, as described above. For standard purging and dedicated pumps without a sampling port, sampling is performed after the water level in the well recharges to at least 80 percent of hydrostatic. Then, groundwater samples are collected using the following procedures.

- A clean Teflon bailer is lowered and partially submerged into the well water to collect a groundwater sample.
- If PSH is present in the sample bailer, PSH thickness is recorded on the field log, and no sample is collected for laboratory analysis.
- For volatile organic analyses, groundwater samples are collected in chilled, 40-milliliter, VOA vials with Teflon-lined caps. A pre-measured quantity of hydrochloric acid preservative is added to all vials by the laboratory prior to receipt by HFA. Samples are held at 4°C or less while in the field and in transit to the laboratory. Other appropriate containers, preservatives, and holding protocols are used for non-volatile analyses.
- VOA vials are filled completely so that no headspace or air bubbles are present within the vial. Care is taken so that the vials are not overfilled, and the preservative is not lost.

- Sample containers are immediately labeled and sealed after collection. For VOA vials, the label is placed to overlap the edge of the cap as a custody seal, unless a separate custody seal is being used.
- Samples are stored in a cooler while on-site and in transport to the laboratory or office. The cooler has sufficient ice to maintain appropriate temperature prior to collecting samples. The VOA vials are kept chilled both prior to and after filling. Hot or warm containers are not used when volatile compounds are the target analytes.

### **DECONTAMINATION PROCEDURES**

Decontamination of monitoring and sampling equipment is performed prior to all monitoring and sampling activities. Decontamination procedures consist of a three-step process. The initial decontamination is performed using a non-phosphate soap, such as Simple Green or Alconox, in tap water in a 5-gallon bucket. A soft-bristle bottlebrush is used to thoroughly clean the inside and outside of the equipment. The brush is used in the first bucket only; it does not travel from bucket to bucket with the equipment. This procedure minimizes any transport of the contaminants, which should stay in the first bucket. The equipment is then rinsed in a second 5-gallon bucket of tap water, followed by a third 5-gallon bucket of tap water as a final rinse. The decontamination water is disposed of using the same procedures as the purge water.

### **WELL CONDITION**

The condition of the well is checked during the monitoring event. The well lid and cap are secured, and any debris present in the well box is removed. Any deficiencies with the well box and pad that cannot be fixed during the monitoring event are noted in the log. The log is given to the project manager for correction of the deficiencies at a future date.

### **QUALITY ASSURANCE/QUALITY CONTROL SAMPLES**

A trip blank, temperature blank, and/or other blanks are taken for quality assurance/quality control (QA/QC) purposes.

- A trip blank sample is kept with any samples being analyzed for volatile organic compounds (VOCs). A trip blank is a sample of clean water that is supplied by the laboratory and is transported to and from the field and to the laboratory with the field samples. The designation "QCTIPBK" or "QCTB" is used for the sample name on the field label. Samplers record on the chain-of-custody (COC) the date that the trip blank is taken to the field for sampling, not the date that the trip blank was prepared by the laboratory. One trip blank per cooler per day is collected. Unused trip blanks are stored in a cooler

dedicated to this purpose. The trip blank cooler is not refrigerated, but is kept in a clean location away from possible VOC contaminants.

- Temperature blank sample containers are supplied by the laboratory and kept in a cooler used to transport samples. The temperature blank is placed in the cooler prior to going to the field and is kept there until the cooler is delivered to the laboratory.

#### **CHAIN OF CUSTODY**

A chain of custody form is completed for each group of samples delivered to the laboratory, as follows.

- A separate COC is completed for each day of sampling. If samples are collected on separate days for the same site, a separate COC is completed for each sampling day, and the COC is always kept with the samples. If samples are shipped off-site for laboratory analysis, individual coolers with separate COCs are sent for each day/cooler shipped.
- All fields/spaces on the COC are filled out completely, and all persons having control of the samples sign the COC to show transfer of sample control between individuals. At times when the field sampler is not delivering samples directly to the laboratory, the samples may be turned over to a sample manager for shipping. In this instance, the sample manager takes custody of the samples, and both the sampler and sample manager sign and date the COC to clearly show custody transfer.
- The COC is placed inside the cooler, and a custody seal is placed on the outside of the cooler prior to shipping. The receiving laboratory indicates if the cooler was received with the custody seal intact.
- If samples are sent to the laboratory via UPS, FEDEX, etc., this fact is indicated on the COC, and the sample manager also indicates the date and time the custody seal is placed on cooler for delivery to the shipping agent (the shipping agent does not sign the COC).
- For trip blanks, the COC indicates the date the trip blank was taken to the field for sampling, not the date the trip blank was prepared by the laboratory (the latter date may appear on the VOA label).
- New electronic deliverable format (EDF) requirements of California AB2886 mandate that COCs and laboratory reports maintain consistent and unique names between sites (Global ID) and sample location/well names (Field Point ID). This information must be



consistent with the initial information supplied to GeoTracker, and for each subsequent quarterly sampling event.

## **SAMPLE HANDLING**

### **Refrigerator Storage and Temperature Log**

Samples may be stored in a refrigerator prior to transport to the laboratory. Refrigerator storage is maintained under the following conditions.

- Refrigerators used for sample storage are dedicated for that usage only (no food or other materials are stored in sample refrigerators).
- Refrigerators can be locked from the outside by a sample manager, and only the sample manager has access to the samples while they are in storage.
- Refrigerators are maintained at a temperature of 4°C or less, and are adjusted daily depending on thermometer readings.
- Each refrigerator contains a dedicated, reliable thermometer. The thermometer is designed for use in a refrigerator and is fixed or secured to the inside of the unit. The thermometer range is specific for measuring temperatures less than 4°C.
- A temperature log is kept on the outside of the refrigerator in a lightweight, three-ring binder, or similar logbook. Temperatures are recorded daily or when the refrigerator is open for sample management.
- Completed COCs are kept with the samples stored in the refrigerators. The COCs may be held on a clipboard outside the refrigerator, or may be placed inside the cooler if the entire cooler is placed inside the refrigerator.
- If a cooler is placed in the refrigerator, the cooler lid remains open to insure that samples are maintained at the refrigerator temperature.

### **Cooler Packing**

The sample coolers are packed as directed by the receiving laboratory. The following cooler packing procedures are used.

- The cooler contains enough ice to maintain the required temperature.

- Water ice (not dry ice or ice packs) is used for shipping.
- The ice is placed above and below the samples in at least two sealable plastic bags. This procedure requires that the packing/divider material be removed and replaced.
- The COC is placed in the cooler in a sealed plastic bag, and the cooler lid is taped closed to secure it for transport and to minimize loss of temperature. A custody seal is placed vertically across the seam of the cooler lid.



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#### **ATTACHMENT 4.**

#### **AQUIFER TEST PROCEDURES**

## **AQUIFER TEST PROCEDURES**

### **PLANNING THE AQUIFER TEST**

Prior to conducting the test, available project information is reviewed:

- to determine the appropriate type of test to perform (pumping test versus slug test);
- to determine which wells should be pumped and observed;
- to estimate the likely pumping rate and pumping equipment requirements;
- to estimate the pumping duration required to achieve adequate drawdown in the observation wells; and
- to estimate the quantity and quality of waste water that will be produced during the test and design a waste water disposal plan.

These objectives are accomplished by:

- developing a conceptual model of the aquifer (confined or unconfined, regional or perched groundwater, aquifer thickness, and aquifer homogeneity);
- estimating aquifer properties based on soil descriptions and other available data;
- estimating a pumping rate based on the estimated aquifer properties and well recharge rates obtained from well purging records;
- estimating whether observation well drawdown is likely based on estimated aquifer properties, pumping rate, and/or distances to observation wells; and
- estimating the duration of the test and, using the anticipated pumping rate, the quantity of water that will be produced.

The information outlined above is also used to choose appropriate pumping equipment to achieve the required flow rates, determine whether to attempt a constant-rate pumping test or conduct slug tests, choose an appropriate extraction and observation well configuration for aquifer testing, and determine whether installation of new extraction and/or observation wells is needed.

There are two basic types of aquifer tests: pumping tests and slug tests. Pumping tests measure potentiometric surface changes in the aquifer due to pumping from an extraction well. Slug tests measure the rate of flow of water into or out of a well in

response to rapidly raising or lowering the water level in the well. Slug test results are not as useful as pump test results because slug tests depend on well construction as well as aquifer properties. In addition, aquifer tests are conducted to obtain design parameters for pump-and-treat remediation systems. If a slug test is contemplated for a site because the wells cannot yield a sustainable pumping rate, the site is probably not amenable to pump-and-treat.

## **PUMPING TEST PROCEDURES**

### **Equipment**

The equipment used to conduct the aquifer test includes a Grundfos Environmental Redi-flow submersible groundwater pump or equivalent, and an In Situ Hermit Data Logger and associated pressure transducers or equivalent. Ancillary equipment includes a calibrated flow gauge and electronic water level meters.

### **Initial Water Level Survey**

Prior to the aquifer test, the depth to water is measured to an accuracy of 0.01 foot in all wells at the site. The data are used to construct a groundwater elevation contour map, from which estimates of natural groundwater flow direction and gradient are obtained.

### **Trend Test**

A trend test is conducted to identify any background variations in water levels. Groundwater levels are logged at 1-minute intervals for at least 1 hour in the wells that have pressure transducers. If background variations are present, the trend test data are used to remove the effect of such variations on time-drawdown measurements recorded during the aquifer test.

### **Step-Drawdown Test**

A step-drawdown test is conducted to determine an appropriate pumping rate for the constant-rate pumping test. The step-drawdown test is conducted by pumping a monitoring or extraction well at three or more successively higher rates for a duration of at least 15 minutes each, or until the pumping well water level stabilizes. Water levels within an observation well are also monitored during the step-drawdown test. Pumping rates are generally set at one-third, two-thirds, and maximum pump capacity. If the aquifer is low-yielding and the well pumps dry at the lowest possible pumping rate, slug tests are conducted instead of a pumping test. Otherwise, the step-drawdown test data are used to choose an optimum pumping rate for the constant-rate pumping test.

### **Constant-Rate Pumping Test**

After water levels have recovered from the step-drawdown test, a constant-rate pumping test is conducted by pumping water from the chosen pumping well at a constant rate. Groundwater levels are recorded in the observation well(s) and possibly the pumping well (depending on the setup) using the data logger and downhole

pressure transducers. The duration of the test is at least 3 hours, and may be continued to obtain adequate drawdowns in the observation wells. The test is terminated if it is clear that observation well drawdown will not occur.

At the end of the constant-rate pumping test, the pump is shut off and a recovery test is conducted by monitoring water levels as they approach initial (static) conditions.

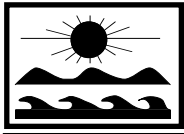
### **SLUG TESTS**

Slug tests are conducted by lowering or raising the water level in the well, and monitoring the water level recovery over time. Rising-head slug tests are performed by pumping or bailing at least one well volume from the well casing and surrounding gravel pack, and recording the rate of water-level rise using pressure transducers and a data logger or a standard water level meter. Falling-head tests (conducted only in wells that are screened below the water table) are performed by adding water or a solid "slug" to the well casing and recording the water-level drop over time.

Slug test data from a rising head test are used to estimate a sustainable pumping rate. The rate of water-level rise is measured, and the volume of water entering the well during the rise can be calculated from the diameters of the casing and the well bore, and the porosity of the gravel pack between the casing and the well bore. The resulting well recharge rate is the maximum sustainable pumping rate. The actual sustainable pumping rate will be less than this value due to long-term drawdown in the formation.

### **WASTE WATER DISPOSAL**

All produced groundwater is pumped on-site into 55-gallon drums, a polyethylene tank, or a Baker tank, depending on the quantity. Water is removed by a vacuum truck within 2 to 3 days after the day of the aquifer test and shipped to an appropriately licensed disposal or recycling facility. If an appropriate groundwater treatment system for waste-water disposal is available, it is used.



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## **ATTACHMENT 5.**

### **WORKER HEALTH AND SAFETY PLAN**

DATE: September 12, 2005

**WORKER HEALTH AND SAFETY PLAN FOR UNDERGROUND STORAGE TANK INVESTIGATIONS  
SITE-SPECIFIC INFORMATION**

Site Address: 15757 Paramount Boulevard, Paramount, California  
Name of Business Occupying Site: ExxonMobil Oil Corporation Former Service Station  
#18-MF0  
Responsible Party Name: ExxonMobil Oil Corporation  
Responsible Party Contact: Gene Ortega Tel. #: (310) 212-1870  
  
Agency Project Manager: Noman Chowdhury Tel. #: (213) 576-6704  
(CRWQCB-LAR)

**FIELD ACTIVITIES AND DURATION OF THIS INVESTIGATION:**

Install one piezometer well and conduct an aquifer test for approximately 3 days.

**KNOWN HAZARDS AT THE SITE INCLUDE:**

Gasoline, subsurface utilities, and traffic

**KEY PERSONNEL AND RESPONSIBILITIES:**

NAME	RESPONSIBILITIES
Jeff Nobriga (805) 766-8427	<u>SITE SAFETY OFFICER</u> - Primarily responsible for site safety, response operations, and protection of the public. Responsible for work site inspections to identify particular hazards and define site security.
James Anderson, REA (805) 641-4089	<u>PROJECT MANAGER</u> - Primarily responsible for site characterization. The project manager delineates authority, coordinates activities and functions, and directs activities related to mitigative efforts of clean-up contractors.
Jeff Nobriga (805) 766-8427	<u>SITE INVESTIGATIVE PERSONNEL</u> - Responsible for actual field work including sampling, monitoring, equipment use, and other related tasks as defined by the project manager.
<u>OTHER</u>	

**ANTICIPATED WEATHER CONDITIONS FOR THIS AREA DURING THE PROJECT'S DURATION WILL BE:**

Temp. range: 70-90°F Humidity: low Ambient temp.: 80°F  
Potential for heat stress: High:            Medium: X Low:           

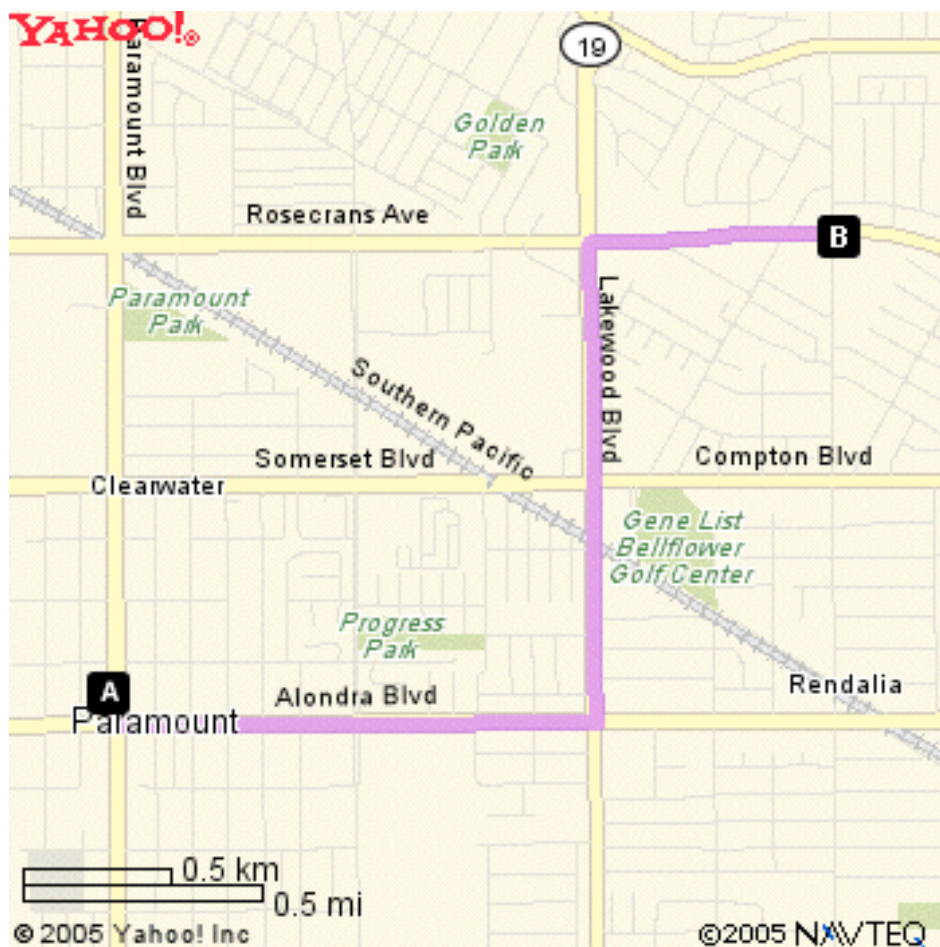
**ANTICIPATED PROTECTION LEVEL DURING THIS PROJECT\***

Level "D" \*Will be upgraded or downgraded per the exposure monitoring plan

**EMERGENCY INFORMATION:**

All emergency calls: 911  
Closest hospital with emergency room: Kaiser Permanente Hospital  
9400 Rosecrans Avenue #4300, Bellflower, California, (562) 461-3000  
Map Showing Route from Site to Hospital Attached? Yes: X No:





- 1:** Start at PARAMOUNT BOULEVARD - go 0.1 mile
- 2:** Turn Left on ALONDRA BOULEVARD - go 1.0 mile
- 3:** Turn Left on LAKEWOOD BOULEVARD - go 1.0 mile
- 4:** Turn Right on ROSECRANS AVENUE - go 0.5 mile
- 5:** End at KAISER PERMANENTE HOSPITAL, 9400 ROSECRANS AVENUE #4300, BELLFLOWER, CALIFORNIA

**Total Estimated Time:** 5 minutes **Total Estimated Distance:** 2.6 miles

LEGEND	EXXONMOBIL OIL CORPORATION
KAISER PERMANENTE HOSPITAL 9400 ROSECRANS AVENUE #4300 BELLFLOWER, CALIFORNIA (562) 461-3000	FORMER SERVICE STATION #18-MF0 15757 PARAMOUNT BOULEVARD PARAMOUNT, CALIFORNIA FIGURE 1 - HOSPITAL MAP
	<b>HOLGUIN, FAHAN &amp; ASSOCIATES, INC.</b>

## **WORKER HEALTH AND SAFETY PLAN FOR UNDERGROUND STORAGE TANK SITE INVESTIGATIONS**

This document outlines Holguin, Fahan & Associates, Inc.'s (HFA's) worker health and safety plan (HASP) for its employees to be used at underground storage tank (UST) sites. Site-specific information is provided on the cover page of this document. Prior to the start of each day's field activities, the HASP will be reviewed by all on-site personnel at a health and safety tailgate meeting. All on-site employees, subcontractors, and regulatory agents will acknowledge that they have reviewed the HASP by signing the tailgate meeting form (see Exhibit 1 for the form).

This HASP was developed by HFA's industrial hygienist through consultation of the following documents:

- Occupational Safety and Health Administration (OSHA) 29 CFR 1910 – "Hazardous Waste Operations and Emergency Response, Final Ruling," March 1989;
- National Institute of Occupational Safety and Health/OSHA/United States Coast Guard/Environmental Protection Agency "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," October 1985;
- HFA's Corporate Health and Safety Program;
- ExxonMobil Oil Corporation's Operations Integrity Management System; and
- Chevron Environmental Management Company's Loss Prevention System.

This worker health and safety plan is divided into the following categories:

1. Job Hazard Assessment;
2. Exposure Monitoring Plan;
3. Personal Protective Equipment;
4. Work Zones and Security Measures;
5. Decontamination and Disposal;
6. Employee Training; and
7. Emergency Procedures.

### **1. JOB HAZARD ASSESSMENT**

Immediate tasks at any UST site include an evaluation of any present or potential threat to worker and public safety. Questions need to be answered regarding the dangers of significant vapor exposures and potential explosion hazards.

An analysis of known and potential site-specific hazards is outlined in the Job Safety Analysis in Exhibit 2.

### **Potential Chemical Hazards**

The chemical components of gasoline that are the most dangerous to site workers are gasoline, hydrocarbon-containing soil, benzene, toluene, ethylbenzene, xylene, methyl tertiary butyl ether (MTBE), and potentially, organic lead (see Exhibit 3 for the Material Safety Data Sheets). In addition, solvents such as 1,2-dichlorobenzene and 1,2-dichloroethane may be used as cleaning solutions at service stations. The primary health risks associated with each chemical are described below.

Gasoline (free-phase) – Confirmed animal carcinogen with unknown relevance to humans. A threshold limit value (TLV) (8-hour average) of 300 parts per million by volume (ppmv) and a short-term exposure limit (STEL) (15 minute average) of 500 ppmv have been assigned to gasoline (see Exhibit 3). This value of was assigned based on an average of 2 percent benzene (0.5 ppmv TLV) in gasoline. Low-level inhalation exposure to gasoline can cause irritation to the eyes, nose, and respiratory system; headache; dizziness; and nausea. Contact with the skin causes irritation.

Hydrocarbon-containing soil – Generally contains less than 1 percent gasoline. A TLV of 300 ppmv has been assigned to soil containing gasoline hydrocarbons.

Benzene – Known human carcinogen. A TLV of 0.5 ppmv or 1.6 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) and an STEL of 2.5 parts per million (ppm) have been assigned to benzene. Benzene has a low odor threshold limit of 1.4 ppm. Low-level inhalation exposure to benzene can cause irritation to the eyes, nose, and respiratory system; dizziness; headache; and nausea.

Toluene – A TLV of 1,500 ppm or  $187.5 \text{ mg}/\text{m}^3$  has been assigned to toluene. Toluene has a low odor threshold limit of 2.1 ppm. Low-level inhalation exposure to toluene can cause fatigue, weakness, confusion, and euphoria.

Ethylbenzene – A TLV of 100 ppm or  $435 \text{ mg}/\text{m}^3$  has been assigned to ethylbenzene. Ethylbenzene has a low odor threshold limit of 2 ppm. Low-level inhalation exposure to ethylbenzene can cause irritation to the eyes and mucous membranes.

Xylene – A TLV of 100 ppm or  $435 \text{ mg}/\text{m}^3$  has been assigned to xylene. No low odor threshold limit has been established for xylene. Low-level inhalation exposure to xylene can cause dizziness, headache, nausea, and drowsiness.

MTBE – Confirmed animal carcinogen with unknown relevance to humans. A TLV of 40 ppm or 144 mg/m<sup>3</sup> has been assigned to MTBE. In laboratory animals, inhalation exposure can cause hyperactivity, coordination problems, convulsions, and unconsciousness.

Ethanol – A TLV of 1,000 ppm or 1,900 mg/m<sup>3</sup> has been assigned to ethanol. High-level inhalation exposure can cause eye and respiratory tract irritation, fatigue, headache, and drowsiness. No reports of chronic exposure to vapors have been reported.

Tetraethyl Lead (Organic Lead) – A TLV of 0.1 mg/m<sup>3</sup> has been assigned to tetraethyl lead. Tetraethyl lead is a colorless or red-dyed liquid at atmospheric conditions. No data are available concerning odor threshold. Acute vapor exposure can cause insomnia, delirium, coma, and skin irritation.

1,2-Dichlorobenzene – A TLV of 50 ppm or 306 mg/m<sup>3</sup> has been assigned to 1,2-dichlorobenzene. 1,2-dichlorobenzene has a low odor threshold limit of 4.0 ppm. Acute vapor exposure can cause coughing, drowsiness, and skin irritation.

1,2-Dichloroethane – A TLV of 200 ppm has been assigned to 1,2-dichloroethane. No data are available concerning odor threshold. Acute vapor exposure can cause coughing, dizziness, drowsiness, and skin irritation.

### **Potential Physical Hazards**

Trenching – Fuel vapor levels will be monitored using a lower explosive limit (LEL) meter or photoionization detector (PID). The presence of underground utilities and fuel facilities is also of concern, and the applicable utility markout service will be notified in advance of any trenching work for identification of all underground structures in the immediate area.

Drilling – Fuel vapor levels will be monitored using a PID or LEL meter. The presence of underground utilities is also of concern, and the applicable utility markout service will be notified in advance of any drilling work for identification of all underground utilities in the immediate area.

Excavations – Fuel vapor levels will be monitored using a PID or LEL meter. All excavations greater than 4 feet in depth will not be entered unless the excavation is properly sloped or shored in accordance with OSHA regulations and certified by a competent person. Confined spaces are never to be entered.

Sampling – Use of personal protective equipment and decontamination procedures will minimize the potential for exposure for personnel conducting site investigation activities.

Traffic – In areas where vehicular traffic is anticipated, a traffic control plan will be developed as part of the HASP. A traffic vest will be worn, traffic control devices will be placed around the work area, and workers will face oncoming traffic, as conditions allow. The vehicle should be placed between the work area and oncoming traffic, where possible. For work in the public right-of-way, traffic control (delineators, signs, light boards, and so forth) will be setup in accordance with the Work Area Traffic Control Handbook and local agency requirements as outlined in the permit. For high-risk traffic areas, at least two workers will be present.

Heat – The effects of high temperatures will be monitored by each individual and by all coworkers at the site. If site ambient temperature exceeds 90°F and the potential for heat stress is considered to be high as indicated on the site-specific information page, the effects should be controlled through regular work breaks; wearing loose, lightweight clothing; working during cooler hours of the day; and ingestion of cool fluids (recommended 8 ounces every 20 minutes) as outlined in the American Conference of Governmental Industrial Hygienists' Guidance for heat stress conditions. Common heat disorders, symptoms, and first aid measures include the following.

- Heat cramps – Heat cramps are caused by dehydration and loss of salt. Its symptoms include spasms or cramps in the limbs and hot skin. Workers should consume fluids at frequent intervals.
- Heat exhaustion – Symptoms include thirst, headache, clammy skin, nausea, vertigo, weakness, and fainting. Clothing should be loosened, and the worker should be removed from the hot environment and given fluids and adequate rest.
- Heatstroke – Symptoms include red, dry skin; confusion; irrational behavior; lack of sweating; convulsions; and potentially loss of consciousness. Professional medical assistance should be called immediately. In the interim, the worker should be taken out of the hot environment, outer clothing should be removed, the skin should be wetted, and the worker should be given fluids.

## **2. EXPOSURE MONITORING PLAN**

Potential exposure hazards found at UST sites primarily include liquid gasoline or airborne vapors from leaking USTs or associated piping, containment boxes, sumps, and hydrocarbon-containing soil and groundwater.

The most dangerous airborne vapor likely to be encountered during a UST investigation is benzene. Gasoline vapor concentration levels will be monitored in the breathing zone with a PID, calibrated prior to use on a daily basis to an isobutylene standard, or an LEL meter using a hexane standard. The calibration will be recorded, and a copy of the documentation will be kept with the PID and LEL. When the action level of 150 ppmv (one-half of the TLV of gasoline) is detected and sustained in the breathing zone, respiratory protection will be required using full-face or half-face respirators with organic vapor cartridges (Level C protection), and vapor suppression, ventilation, or other engineering controls may be applied.

Monitoring for combustible gases will also be performed using an LEL meter when vapor concentrations in excess of 2,000 ppmv are detected with the PID. The withdrawal level is 20 percent of the LEL for gasoline vapors, or 2,800 ppmv, in the breathing zone. If this level is exceeded, the work party will be IMMEDIATELY withdrawn from the work area.

### **3. PERSONAL PROTECTIVE EQUIPMENT**

The level of protection during the site investigation will usually be Level D. Level D protective equipment includes: long pants, safety boots, traffic vest, hearing protection, safety glasses, gloves, and hard hats if drilling or trenching operations are in progress. A flame-retardant suit is required if phase-separated hydrocarbons are encountered.

Upgrading the protection level would be based on airborne vapor concentration equaling or exceeding the action level (150 ppmv). An upgrade to Level C protection would be required if the action level is equaled or exceeded. The equipment required for Level C would be a full-face or half-face, air purifying respirator and may include Tyvek suits with taped arm and leg seals, in addition to the Level D protective equipment. If the vapor concentrations exceed 1,000 ppmv, canister-equipped respirators will be used. If the withdrawal level is met or exceeded (20 percent of the LEL in the breathing zone), work will cease until the vapor level is measured to be below 20 percent of the LEL, and vapor suppression, ventilation, or other engineering controls will be applied.

If the OSHA Permissible Exposure Limit or a time-weighted average of 85 decibels is exceeded, or if heavy equipment (i.e., jackhammer, drill rig, backhoe) is used, hearing protection will be worn.

A fire extinguisher, first aid kit, and eyewash will be maintained on-site. Decisions for workers' safety and the personal protective equipment to be worn are based on a continual evaluation of conditions.

#### **4. WORK ZONES AND SECURITY MEASURES**

To facilitate a minimum exposure to dangerous vapors and/or physical hazards, only authorized persons will be allowed in the work zone. Work zones will be defined by the client, the general contractor, or HFA staff, who will also be responsible for maintaining security within these zones. The work zone will be delineated from the job site using traffic delineators, caution tape, and so forth. A traffic control plan delineating the work zone will be developed as part of the HASP. Only the minimum number of personnel necessary for the UST investigation will be present in the work zone. Smoking is never permitted in the work zone.

#### **5. DECONTAMINATION AND DISPOSAL**

HFA's standard operating procedures (SOP) establish practices that minimize contact with potentially impacted materials. Decontamination procedures are used if there is suspected or known impacted equipment, supplies, instruments, or any personnel surfaces. Nitrile gloves should be worn during decontamination activities. The equipment will be decontaminated using a nonphosphate soap and water wash and two tap-water rinses. Wash water will be recycled in accordance with the appropriate regulatory procedures and HFA's SOP for soil boring, direct-push sampling, and well construction.

#### **6. EMPLOYEE TRAINING**

All applicable HFA employees working on the site will have had, at a minimum, the required 40-hour OSHA Training for Hazardous Waste Site Activities with annual 8-hour refresher training and medical surveillance exam (29 CFR 1910, 120), which includes training in the use of respirators and other personal protective equipment. Annual individualized respirator fit testing is required of all applicable HFA employees working at the site.

Personnel in a supervisory role will have undergone an additional 8 hours of training in accordance with OSHA requirements (29 CFR 1910, 120, page 373 [4]).

#### **7. EMERGENCY PROCEDURES**

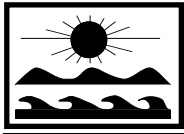
If an emergency occurs, on-site personnel will contact EMT personnel by dialing 911. All work will cease, and reasonable efforts will be made to secure the work area, if it is deemed safe to do so.

In the event of overt personnel exposure (i.e., skin contact, inhalation, or ingestion), the victim will be transported to and treated at the closest hospital (see hospital map attached). In the event of a more serious injury, site personnel will contact the local emergency services by dialing 911 for assistance.

If a fuel release occurs as a result of site investigation activities, the emergency shutoff switch at active service station locations will be activated. Absorbent or other available material (i.e., bentonite and cat litter) will be placed around the spill to prevent the substance from entering utility vaults or the public right-of-way. A work zone will be setup around the release, and fuel vapor levels will be monitored with an LEL or PID. The appropriate agencies will be notified in accordance with local regulations, and all absorbent material will be disposed of in an appropriate manner.

In the event of a major emergency or natural disaster, all workers will evacuate the work area and meet at a previously designated safe area, where all personnel will be accounted for.





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ENVIRONMENTAL MANAGEMENT CONSULTANTS

**EXHIBIT 1.**

**TAILGATE MEETING FORM**

DATE:

SITE:

**HEALTH AND SAFETY MEETING  
DAILY SIGN-IN SHEET**

*By signing, I acknowledge that I have reviewed the site health and safety plan (HASP) and have participated in a site safety meeting conducted prior to the start of work. I agree to abide by the guidelines of the HASP.*

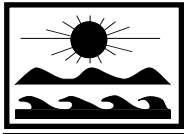
In an emergency, all personnel should evacuate the site, and meet at the location designated below for a headcount:

<u>NAME</u>	<u>COMPANY</u>	<u>SIGNATURE</u>	<u>TIME (IN/OUT)</u>
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____
_____	_____	_____	____/____

Note: This sign-in sheet may be substituted in the field by a client or project specific sign-in sheet.

Document questionable items observed during the day below or activities or safety topics that warrant additional discussion. These items should be reviewed at the Take 2 at 2 Break or during the next morning's health and safety meeting.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_



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ENVIRONMENTAL MANAGEMENT CONSULTANTS

**EXHIBIT 2.**

**JOB SAFETY ANALYSIS**

# Job Safety Analysis

JSA Type: <input checked="" type="checkbox"/> SAR Operations <input type="checkbox"/> Transport <input type="checkbox"/> Office <input type="checkbox"/> Construction		<input type="checkbox"/> New <input checked="" type="checkbox"/> Revised		Date: 9/12/05
HFA Office: Ventura		Client: ExxonMobil Oil Corporation		Loc: 18-MF0
Work Type: Environmental		Work Activity: Aquifer Testing		
<b>Personal Protective Equipment (PPE):</b> Minimum PPE is Level D including, as necessary: safety glasses or goggles, traffic vest, steel-toed boots, hearing protection, and gloves (type dependent on job-specific requirements) <b>Additional PPE may be required in the Health &amp; Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures.</b>				
<b>Development Team</b>	<b>Position/Title</b>	<b>Reviewed By</b>	<b>Position/Title</b>	<b>Date</b>
Jon Griffiths	Corporate Safety Coordinator	Mark Fahan	VP/Operations Manager	
Todd McFarland	Associate Geologist	Steve Edelman	VP of Technical Services	
Lorien Sanders	Associate Hydrogeologist	James Anderson	Associate Engineer	
Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used during field activities. Also consider weather conditions (heat, cold, rain, lightning).				
<b>❶ Job Steps</b>	<b>❷ Potential Hazard</b>	<b>❸ Critical Actions</b>		
1. Personal health and safety	<ul style="list-style-type: none"> <li>Heat stress and Heat stroke</li> <li>General</li> </ul>	<ul style="list-style-type: none"> <li>Drink plenty of fluids and have plenty of fluids available (water and sports drinks are recommended; coffee and soda may actually cause further dehydration).</li> <li>Wear loose, non-restrictive clothing and hat/cap.</li> <li>Stay in shade as much as possible to keep cool (use vehicle and air-conditioning if necessary).</li> <li>Use sunscreen to prevent sunburn and lip balm to prevent chapped lips.</li> <li>Be aware of faintness, dizziness, unconsciousness, paleness, and profuse sweating in site personnel (contact PM or if severe, contact emergency personnel).</li> <li>Redness to the face, high body temperature, and lack of sweating may indicate heat stroke (contact emergency personnel immediately).</li> <li>Conduct safety meeting to review site conditions prior to start work</li> <li>Conduct nearest hospital, location of health and safety equipment (first aid kit/eye) and emergency shutoff switch</li> </ul>		
2. Working during evening hours	<ul style="list-style-type: none"> <li>Rest/sleep</li> <li>Noise</li> <li>Lighting</li> </ul>	<ul style="list-style-type: none"> <li>Confirm that all on-site workers have had necessary rest prior to beginning night activities.</li> <li>Ensure proper notifications are given and permits received.</li> <li>Wear hearing protection during use of equipment.</li> <li>Use light towers to provide the</li> </ul>		

	<ul style="list-style-type: none"> <li>• Security</li> <li>• Trip/fall hazards</li> <li>• Station traffic/pedestrians</li> </ul>	<ul style="list-style-type: none"> <li>• necessary lighting to perform task safely (at least 1 tower).</li> <li>• Off-duty officer or other security detail, as necessary or as required by permits.</li> <li>• Maintain good housekeeping and designate clear paths of travel.</li> <li>• Watch for vehicles and beware of intoxicated pedestrians and drivers.</li> <li>• Set up exclusion zone and traffic control per written plan and include lighted barricades.</li> <li>• Post signs (no smoking, caution hardhat area, prop 65 and do not enter) if applicable.</li> </ul>
3. Delivery and set-up of holding tank	<ul style="list-style-type: none"> <li>• Station traffic</li> <li>• Movement of heavy tank - crushing</li> <li>• Spills/Leaks</li> </ul>	<ul style="list-style-type: none"> <li>• Wear traffic vest, use delineators and vehicles as traffic barrier when possible, direct/spot driver to prevent accidents.</li> <li>• If tank is lifted, make sure it is stabilized; do not stand near/under elevated tank or tilt-bed truck.</li> <li>• Check all release valves to ensure they are closed before discharging to tank.</li> <li>• Secure hose entering tank so there is no chance of slipping/shifting out of tank.</li> <li>• Have secondary containment around tank as required</li> </ul>
4. Setup and well measurements	<ul style="list-style-type: none"> <li>• Station traffic</li> <li>• Heavy lifting</li> <li>• Noise</li> <li>• Hand tools, moving machinery</li> <li>• Hydrocarbon exposure</li> <li>• Cross-contamination of wells</li> <li>• Hot surfaces</li> <li>• Fire</li> <li>• Slip/trip/fall</li> </ul>	<ul style="list-style-type: none"> <li>• Wear traffic vest.</li> <li>• Use vehicle and delineators to create work zones as per written Site Traffic Plan.</li> <li>• Watch for vehicles.</li> <li>• Use buddy system for high-risk areas.</li> <li>• Use proper lifting posture when lifting hose reels and other equipment.</li> <li>• Wear ear plugs or appropriate PPE when working in noisy environment.</li> <li>• Wear leather gloves when opening well covers and caps.</li> <li>• Wear nitrile gloves when handling down-well equipment.</li> <li>• Perform careful triple-rinse decon of water level indicator between wells</li> <li>• Avoid generator exhaust.</li> <li>• Have fire extinguisher available on-site.</li> <li>• Issue hot work permit and keep generator from vapor sources</li> <li>• Check well for PSH and do not use electric pumps if present</li> <li>• Maintain good housekeeping</li> <li>• Use hand rail on ladder to climb tank</li> <li>• Use three points of contact to climb ladder</li> </ul>
5. Pump Test	<ul style="list-style-type: none"> <li>• Station traffic</li> <li>• Heavy lifting</li> <li>• Noise</li> </ul>	<ul style="list-style-type: none"> <li>• Same as previous job steps</li> <li>• Use proper lifting posture when lifting hose reels and other equipment.</li> <li>• Wear ear plugs or appropriate PPE when working in noisy environment.</li> </ul>

	<ul style="list-style-type: none"> <li>• Hand tools, moving machinery</li> <li>• Hydrocarbon exposure</li> <li>• Hot surfaces</li> <li>• Fire</li> <li>• Slip/trip/fall</li> </ul>	<ul style="list-style-type: none"> <li>• Wear leather gloves when opening well covers and caps.</li> <li>• Wear nitrile gloves when handling down-well equipment.</li> <li>• Avoid generator exhaust.</li> <li>• Have fire extinguisher available on-site.</li> <li>• Check well for PSH and do not use electric pumps if present</li> <li>• Maintain good housekeeping</li> <li>• Use hand rail on ladder to climb tank</li> <li>• Use three points of contact to climb ladder</li> </ul>
6. Site cleanup	<ul style="list-style-type: none"> <li>• Traffic</li> <li>• Debris or equipment left on-site or unsecured - trip hazard or financial loss</li> </ul>	<ul style="list-style-type: none"> <li>• Wear traffic vest and watch for vehicles.</li> <li>• Make careful visual sweep of site.</li> <li>• Check for tools, equipment, debris, or dirt left on-site.</li> </ul>

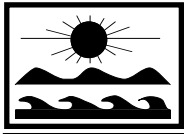
# Job Safety Analysis

JSA Type: <input checked="" type="checkbox"/> SAR Operations <input type="checkbox"/> Transport <input type="checkbox"/> Office <input type="checkbox"/> Construction		<input type="checkbox"/> New <input checked="" type="checkbox"/> Revised		Date: 9-12-05
HFA Office:      Ventura		Client: ExxonMobil Oil Corporation		Loc: 18-MF0
Work Type: Environmental		Work Activity: Soil Boring/Monitoring Well Hole Clearance, Drilling and Installation		
<u>Personal Protective Equipment (PPE):</u> Minimum PPE is Level D including: safety glasses or goggles, hard hat, traffic vest, steel-toed boots, hearing protection, and gloves (type dependent on job-specific requirements) <b>Additional PPE may be required in the Health &amp; Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures.</b>				
<b>Development Team</b>	<b>Position/Title</b>	<b>Reviewed By</b>	<b>Position/Title</b>	<b>Date</b>
Jon Griffiths	Corporate Safety Coordinator	Mark Fahan	VP/Operations Manager	
James Anderson	Project Manager			
Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). Safe Performance Self Assessment (SPSA) procedures must be used prior to starting each task. Also consider traffic and weather conditions (heat, cold, rain, lightning).  All employees assigned to this task must attend the daily site safety meeting, which will include the review of this and all other pertinent JSAs, Site Specific Health and Safety Plan (HASP), types of potential hazards, and actual hazards present and controls for these hazards. This meeting must be documented at the beginning of each workday, by completing the Daily Site Safety Meeting Checklist.				
<b>① Job Steps</b>	<b>② Potential Hazard</b>	<b>③ Critical Actions</b>		
1. Personal health and safety/Daily Safety Meeting	<ul style="list-style-type: none"> <li>• Extreme weather conditions</li> <li>• General</li> </ul>	<ul style="list-style-type: none"> <li>• Drink plenty of fluids and have plenty of fluids available (water and sports drinks are recommended; coffee and soda may cause further dehydration).</li> <li>• Wear proper attire for heat or cold.</li> <li>• Use sunscreen to prevent sunburn and lip balm to prevent chapped lips.</li> <li>• Be aware of, faintness, dizziness, unconsciousness, paleness, and profuse sweating in personnel (contact PM or if severe, contact emergency personnel).</li> <li>• Redness to the face, high body temperature, and lack of sweating may indicate heat stroke (contact emergency personnel immediately)</li> <li>• Conduct safety meeting to review site conditions prior to start work</li> <li>• Identify nearest hospital, location of health and safety equipment and site emergency shutoff switch</li> </ul>		
2. Site borings, core/cookie cut surface	<ul style="list-style-type: none"> <li>• Station traffic/pedestrians</li> </ul>	<ul style="list-style-type: none"> <li>• Watch for vehicles</li> <li>• Set up exclusion zone and traffic control per written plan</li> <li>• Post signs (no smoking, caution hardhat area, prop 65 and do not enter)</li> </ul>		

	<ul style="list-style-type: none"> <li>• Subsurface structures</li> <li>• Noise</li> <li>• Equipment or Injury during use of air knife, concrete/ asphalt coring machinery</li> <li>• Fire</li> </ul>	<ul style="list-style-type: none"> <li>• Review geophysical, asbuilt and public utility markout service markings</li> <li>• Wear hearing protection during use of coring machine/drill rig</li> <li>• Wear safety glasses, gloves, and all other PPE when coring is taking place</li> <li>• Keep hands clear of moving objects/pinch points</li> <li>• Evaluate need for moving rig prior to hole clearance</li> <li>• Identify emergency shutoff on equipment</li> <li>• A fire extinguisher must be available on-site</li> <li>• Follow requirements of hot work permit (air monitoring for 10% of LEL)</li> </ul>
3. Clear borehole manually/ air knife	<ul style="list-style-type: none"> <li>• Station traffic/public access</li> <li>• Subsurface structures</li> <li>• Trip/fall hazards</li> <li>• Noise</li> <li>• Flying debris</li> <li>• Back strain</li> <li>• Hydrocarbon exposure</li> <li>• Fire</li> </ul>	<ul style="list-style-type: none"> <li>• Wear traffic vest and watch for vehicles (see Job Step 2 critical actions)</li> <li>• Have one spotter for each potential obstruction watch while driller moves large vehicle</li> <li>• Chock wheels on large vehicles</li> <li>• Set-up other vehicles and caution tape around exclusion zone</li> <li>• Set-up applicable signs</li> <li>• Follow all client and company-required protocols for borehole clearance</li> <li>• Ensure subsurface utilities are marked prior to clearing the borehole</li> <li>• Watch for changes in soil types or other indications of backfill or non-native material</li> <li>• Lockout/tagout utilities where required</li> <li>• Maintain good housekeeping and designate clear paths of travel</li> <li>• Wear hearing protection during use of rig</li> <li>• Wear proper eye protection</li> <li>• Use proper lifting techniques and tools</li> <li>• Wear appropriate PPE and monitor breathing space using calibrated PID</li> <li>• Follow requirements of hot work permit</li> <li>• A fire extinguisher must be available on-site</li> <li>• Identify emergency shutoff switch on rig</li> </ul>
4. Set-up/mast-up drill rig	<ul style="list-style-type: none"> <li>• Overhead obstructions/Power lines</li> <li>• Station traffic/public access</li> </ul>	<ul style="list-style-type: none"> <li>• Check area for obstructions beforehand</li> <li>• Have one spotter for each potential obstruction watch while driller moves vehicle and/or raises mast</li> <li>• Do not move drill rig with mast raised</li> <li>• Keep mast at least 10 feet from overhead power lines</li> <li>• Evaluate parking rig to minimize threats from traffic, vapor sources and flying debris</li> <li>• Set-up other vehicles and caution tape around exclusion zone</li> </ul>



	<ul style="list-style-type: none"> <li>• Roll Over</li> </ul>	<ul style="list-style-type: none"> <li>• Set-up applicable signs</li> <li>• Cross all hills and obstructions head on with mast lowered</li> <li>• Set riggers prior to raising mast</li> </ul>
5. Drill, collect samples	<ul style="list-style-type: none"> <li>• Moving parts, flying dirt/mud, fall from height, hand tools</li> <li>• Trip/fall hazards</li> <li>• Noise</li> <li>• Hydrocarbon exposure</li> <li>• Fire</li> <li>• Back strain</li> <li>• Cross-contamination of samples and /or borings</li> </ul>	<ul style="list-style-type: none"> <li>• Wear prescribed PPE (hard hat, gloves, safety glasses, etc.)</li> <li>• Be aware of hazards</li> <li>• Stay away from moving parts/pinch points and fall from height hazards when possible</li> <li>• Avoid working directly behind drill rig</li> <li>• Identify emergency shutoff on rig</li> <li>• Maintain good housekeeping and designate clear paths of travel</li> <li>• Wear hearing protection during use of rig</li> <li>• Wear nitrile rubber gloves</li> <li>• Screen samples and breathing space with PID, upgrade to OSHA Level C if necessary (organic vapor respirator)</li> <li>• Have fire extinguisher available on-site</li> <li>• Follow requirements of hotwork permit</li> <li>• Use proper lifting techniques and tools</li> <li>• Use triple bucket decontamination for all sampling equipment, and steam clean auger flights between boreholes</li> </ul>
6. Set well casing, backfill and surface borings, set well box	<ul style="list-style-type: none"> <li>• Station traffic</li> <li>• Inadequate sealing of hole/settling</li> <li>• Cement dust exposure</li> <li>• Hand tools</li> </ul>	<ul style="list-style-type: none"> <li>• Wear PPE including reflective traffic vest and watch for traffic (see Job Step 2 critical actions)</li> <li>• Mix grout to specification and completely fill the hole (when using chips, hydrate completely)</li> <li>• Do not allow cement to come in contact with skin and avoid breathing cement dust</li> <li>• Wear leather gloves, safety glasses, and other PPE as required</li> </ul>
7. Site cleanup	<ul style="list-style-type: none"> <li>• Traffic</li> <li>• Debris or equipment left on-site or unsecured can cause tripping hazard</li> </ul>	<ul style="list-style-type: none"> <li>• Wear traffic vest and watch for vehicles</li> <li>• Make careful visual sweep of site</li> <li>• Check for tools, debris, or dirt left on-site</li> <li>• Remove free standing water by sweeping</li> </ul>



**HOLGUIN,  
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ENVIRONMENTAL MANAGEMENT CONSULTANTS

**EXHIBIT 3.**

**MATERIAL SAFETY DATA SHEETS**



123455-22 DIESEL #2, ON-ROAD (LOW SULFUR)  
MATERIAL SAFETY DATA BULLETIN

## 1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: DIESEL #2, ON-ROAD (LOW SULFUR)  
SUPPLIER: EXXONMOBIL OIL CORPORATION  
3225 GALLOWS RD.  
FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency:  
CHEMTREC: 800-424-9300 202-483-7616  
LUBES AND FUELS: 281-834-3296

Product and Technical Information:  
Lubricants and Specialties: 800-662-4525 800-443-9966  
Fuels Products: 800-947-9147  
MSDS Fax on Demand: 613-228-1467  
MSDS Internet Website: <http://emmsds.ihssolutions.com/>

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: HYDROCARBONS AND ADDITIVES

GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
DIESEL FUEL (68334-30-5)	100

COMPONENT(S) OF PRODUCT INGREDIENTS INCLUDE:

NAPHTHALENE (91-20-3)	0.5
ETHYL BENZENE (100-41-4)	0.5

NOTE: Composition may contain up to 0.5% performance additive.

See Section 8 for exposure limits (if applicable).

### 3. HAZARDS IDENTIFICATION

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This product is considered hazardous according to regulatory guidelines (See Section 15).

EMERGENCY OVERVIEW: Clear (May Be Dyed) Liquid. Material is combustible. Liquid can release vapors that readily form flammable mixtures at or above the flash point. Product can accumulate a static charge which may cause a fire or explosion. DOT ERG No. : 128

POTENTIAL HEALTH EFFECTS: Respiratory irritation, headache, dizziness, nausea, loss of consciousness, and in cases of extreme exposure, possibly death. Diesel exhaust may cause lung cancer. Prolonged, repeated skin contact may result in skin irritation or more serious skin disorders. Low viscosity material-if swallowed may enter the lungs and cause lung damage. Note: This product contains polycyclic aromatic hydrocarbons, some of which have been reported to cause skin cancer in test animals and in humans under conditions of poor personal hygiene and prolonged repeated contact.

POTENTIAL ENVIRONMENTAL EFFECTS: Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

For further health effects/toxicological data, see Section 11.

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### 4. FIRST AID MEASURES

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EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Remove contaminated clothing. Dry wipe exposed skin and cleanse yourself with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. (See Section 16 - Injection Injury)

INHALATION: Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with mechanical device or use mouth-to-mouth resuscitation.

INGESTION: Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIANS: Material if aspirated into the lungs may cause chemical pneumonitis. PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE: Hydrocarbon Solvents/Petroleum Hydrocarbons- Skin contact may aggravate an existing dermatitis.

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### 5. FIRE-FIGHTING MEASURES

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EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective, but water should be used to keep fire-exposed containers cool. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire

fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Material is combustible. Liquid can release vapors that readily form flammable mixtures at or above the flash point. Product can accumulate a static charge which may cause a fire or explosion.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): > 55(131) (ASTM D-93).

Flammable Limits (approx.% vol.in air) - LEL: 0.6%, UEL: 7.0%

NFPA HAZARD ID: Health: 1, Flammability: 2, Reactivity: 0

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## 6. ACCIDENTAL RELEASE MEASURES

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NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Eliminate sources of ignition. Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping using explosion-proof equipment or contain spilled liquid with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Eliminate sources of ignition and warn other ships in the vicinity to stay clear. Notify port and other relevant authorities. Confine with booms if skimming equipment is available to recover the spill. Otherwise disperse in unconfined waters, if permitted by local authorities and environmental agencies. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

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## 7. HANDLING AND STORAGE

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HANDLING: Keep product away from high energy ignition sources, heat, sparks, pilot lights, static electricity, and open flame. Harmful in contact with or if absorbed through the skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Store in a cool area. Avoid sparking conditions. Ground and bond all transfer equipment.

SPECIAL PRECAUTIONS: To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or

storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Use the correct grounding procedures. Refer to national or local regulations covering safety at petroleum handling and storage areas for this product.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

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#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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##### OCCUPATIONAL EXPOSURE LIMITS:

ExxonMobil recommends an 8-hour time-weighted average (TWA) exposure of 500 mg/m<sup>3</sup> total vapor (approx. 100 ppm) or 5 mg/m<sup>3</sup> stable aerosols.

Substance Name (CAS-No.)	Source	---TWA---		----STEL----		NOTE
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	
NAPHTHALENE (91-20-3)	OSHA	10	50	15	75	
	ACGIH	10	52	15	79	
ETHYL BENZENE (100-41-4)	OSHA	100	435	125	545	
	ACGIH	100	434	125	543	

NOTE: Limits shown for guidance only. Follow applicable regulations.

VENTILATION: Use in well ventilated area with local exhaust ventilation. Ventilation equipment must be explosion proof. Use away from all ignition sources.

RESPIRATORY PROTECTION: Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the recommended exposure limit. Self-contained breathing apparatus may be required for use in confined or enclosed spaces.

EYE PROTECTION: If splash with liquid is possible, chemical type goggles should be worn.

SKIN PROTECTION: Impervious gloves must be worn. If contact is likely oil impervious clothing must be worn. Good personal hygiene practices should always be followed.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid  
COLOR: Clear (May Be Dyed)  
ODOR: Hydrocarbon  
ODOR THRESHOLD-ppm: NE  
pH: NA  
BOILING POINT C(F): > 149(300)  
MELTING POINT C(F): NA  
FLASH POINT C(F): > 55(131) (ASTM D-93)  
FLAMMABILITY (solids): NE  
AUTO FLAMMABILITY C(F): NE  
EXPLOSIVE PROPERTIES: NA  
OXIDIZING PROPERTIES: NA  
VAPOR PRESSURE-mmHg 20 C: 0.5  
VAPOR DENSITY: > 2.0  
EVAPORATION RATE: NE  
RELATIVE DENSITY, 15/4 C: 0.82-0.87  
SOLUBILITY IN WATER: Negligible  
PARTITION COEFFICIENT: > 3.5  
VISCOSITY AT 40 C, cSt: > 1.0  
VISCOSITY AT 100 C, cSt: NE  
POUR POINT C(F): < -7(20)  
FREEZING POINT C(F): NE  
VOLATILE ORGANIC COMPOUND: NE  
DMSO EXTRACT, IP-346 (WT.%): NA

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

## 10. STABILITY AND REACTIVITY

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STABILITY (THERMAL, LIGHT, ETC.): Stable.  
CONDITIONS TO AVOID: Extreme heat and high energy sources of ignition.  
INCOMPATIBILITY (MATERIALS TO AVOID): Halogens, strong acids, alkalies, and oxidizers.  
HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.  
HAZARDOUS POLYMERIZATION: Will not occur.

## 11. TOXICOLOGICAL DATA

### ---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.  
DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.  
INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.  
EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score:

greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). ---Based on testing of similar products and/or the components.

#### ---SUBCHRONIC TOXICOLOGY (SUMMARY)---

Repeated dermal application of middle distillates, heating oils and diesel oils to rabbits for 2-4 weeks at up to 1 gm/kg resulted in strong to severe skin irritation with some weight loss at the higher dose. Toxic effects ranging from weight loss to mortality was observed in rabbits treated repeatedly with very high doses (6 gm/kg) of these oils. Repeated inhalation exposure of middle distillate and diesel vapor and aerosol to rats for 2-4 weeks at up to 6 mg/l resulted in respiratory tract irritation, lung changes/infiltration/accumulation, and some reduction in lung function.

#### ---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Diesel fuel vapors were tested in an inhalation teratology (developmental toxicity) study in rats and when only minimal maternal toxicity was observed, no fetotoxic or developmental effects were observed. A developmental toxicity study of dermally applied middle distillates did indicate fetotoxicity (reduced litter size, litter weight, increased resorptions) at doses that also caused significant maternal toxicity.

#### ---CHRONIC TOXICOLOGY (SUMMARY)---

Diesel fuel, heating oil and middle distillates have been shown to be carcinogenic in lifetime mouse skin painting bioassays. While in some cases, the tumor incidence is low in the test populations and possibly associated with skin irritation, concurrent evidence from short-term predicative tests (Modified Ames) does indicate some level of mutagenic activity associated with levels of polycyclic aromatic compounds in certain test samples.

#### ---SENSITIZATION (SUMMARY)---

Middle distillate oils were not skin sensitizers when tested in a Modified Buehler Guinea Pig Sensitization Assay.

#### ---OTHER TOXICOLOGY DATA---

Overexposure to diesel exhaust fumes may result in eye irritation, headaches, nausea, and respiratory irritation. Animal studies involving lifetime exposure to high levels of diesel exhaust have produced variable results, with some studies indicating a potential for lung cancer. Limited evidence from epidemiological studies suggest an association between long-term occupational exposure to diesel engine emissions and lung cancer. Diesel engine exhaust typically consists of gases and particulates, including carbon dioxide, carbon monoxide, nitrogen compounds, oxides of sulfur, and hydrocarbons. Diesel exhaust composition will vary with fuel, engine type, load cycle, engine maintenance, tuning and exhaust gas treatment. Use of adequate ventilation and/or respiratory protection in the presence of diesel exhaust is recommended to minimize exposures. This product contains ethylbenzene. The International Agency for Research on Cancer (IARC) has evaluated ethylbenzene and classified it as possibly carcinogenic to humans (Group 2B) based on sufficient evidence



for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans.

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## 12. ECOLOGICAL INFORMATION

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### ENVIRONMENTAL FATE AND EFFECTS:

In the absence of specific environmental data for this product, this assessment is based on information for representative substances.

**ECOTOXICITY:** Based on test results for similar products, this substance may be toxic to aquatic organisms such as algae and daphnia (EL50/ IrL50 = 1-10 mg/L). This substance has also been shown to be toxic to specific fish species (LL50 = 1-10 mg/L for rainbow trout, Atlantic silverside).

**MOBILITY:** Dissolution of the higher molecular weight hydrocarbon components in water will be limited, but losses through sediment adsorption may be significant.

**PERSISTENCE AND DEGRADABILITY:** The majority of the components in this product are expected to be inherently biodegradable. The constituents of diesel fuels/heating oil which are volatilized will photodegrade in the atmosphere. The less volatile, more water-soluble components which are aromatic hydrocarbons will also undergo aqueous photodegradation.

**BIOACCUMULATIVE POTENTIAL:** Not established.

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## 13. DISPOSAL CONSIDERATIONS

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**WASTE DISPOSAL:** Product is suitable for burning for fuel value in compliance with applicable laws and regulations.

**RCRA INFORMATION:** Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity, or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

FLASH: > 55(131) C(F)

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## 14. TRANSPORT INFORMATION

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**NOTE:** The flash point of this material is > 131F. Regulatory classifications vary as follows:

DOT: Flammable Liquid OR Combustible Liquid - (49CFR 173.120(b)(2))  
OSHA: Combustible Liquid  
IATA/IMO: Flammable Liquid

USA DOT:

SHIPPING NAME: Diesel Fuel

HAZARD CLASS & DIV: COMBUSTIBLE LIQUID  
ID NUMBER: NA1993  
ERG NUMBER: 128  
PACKING GROUP: PG III  
STCC: NE  
DANGEROUS WHEN WET: No  
POISON: No  
LABEL(s): NA  
PLACARD(s): Combustible  
PRODUCT RQ: NA  
MARPOL III STATUS: NA

RID/ADR:

HAZARD CLASS: 3  
PACKING GROUP: III  
LABEL: 3  
DANGER NUMBER: 30  
UN NUMBER: 1202  
SHIPPING NAME: Gas Oil  
REMARKS: NA

IMO:

HAZARD CLASS & DIV: 3  
UN NUMBER: 1202  
PACKING GROUP: PG III  
SHIPPING NAME: Gas Oil  
LABEL(s): Flammable Liquid  
MARPOL III STATUS: NA

ICAO/IATA:

HAZARD CLASS & DIV: 3  
ID/UN Number: 1202  
PACKING GROUP: PG III  
SHIPPING NAME: Gas Oil  
SUBSIDIARY RISK: NA  
LABEL(s): Flammable Liquid

STATIC ACCUMULATOR (50 picosiemens or less): YES

-----  
15. REGULATORY INFORMATION  
-----

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.

EU Labeling: Product is dangerous as defined by the European Union Dangerous Substances/Preparations Directives.

Symbol: Xn N Harmful, Dangerous for the environment.

Risk Phrase(s): R40-65-66-51/53.

Limited evidence of a carcinogenic effect. Harmful: may cause lung damage if swallowed. Repeated exposure may cause skin dryness or cracking. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrase(s): S24-2-36/37-62.

Avoid contact with skin. Keep out of the reach of children. Wear suitable protective clothing and gloves. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Contains: Gas oil - unspecified.

Governmental Inventory Status: All components comply with TSCA, EINECS/ELINCS, AICS, METI, DSL, KOREA, and PHILIPPINES.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III:  
This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES:  
FIRE CHRONIC ACUTE

This product contains the following SARA (313) Toxic Release Chemicals:

CHEMICAL NAME	CAS NUMBER	CONC.
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	0.5%

The following product ingredients are cited on the lists below:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
NAPHTHALENE (COMPONENT ANALYSIS) (0.50%)	91-20-3	16, 22
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1, 8, 24
DIESEL OIL..C9-20	68334-30-5	21, 26

--- REGULATORY LISTS SEARCHED ---

1=ACGIH ALL	6=IARC 1	11=TSCA 4	16=CA P65 CARC	21=LA RTK
2=ACGIH A1	7=IARC 2A	12=TSCA 5a2	17=CA P65 REPRO	22=MI 293
3=ACGIH A2	8=IARC 2B	13=TSCA 5e	18=CA RTK	23=MN RTK
4=NTP CARC	9=OSHA CARC	14=TSCA 6	19=FL RTK	24=NJ RTK
5=NTP SUS	10=OSHA Z	15=TSCA 12b	20=IL RTK	25=PA RTK
				26=RI RTK

Code key: CARC=Carcinogen; SUS=Suspected Carcinogen; REPRO=Reproductive

16. OTHER INFORMATION

USE: DIESEL FUEL

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Precautionary Label Text:

CONTAINS DIESEL OIL.. C9-20

WARNING!

COMBUSTIBLE LIQUID AND VAPOR. RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, AND IN CASES OF EXTREME EXPOSURE, POSSIBLY DEATH. LOW VISCOSITY MATERIAL-IF SWALLOWED, MAY BE ASPIRATED AND CAN CAUSE SERIOUS OR FATAL LUNG DAMAGE.

MAY CAUSE SKIN CANCER ON PROLONGED, REPEATED SKIN CONTACT. ANIMAL SKIN ABSORPTION STUDIES RESULTED IN INCREASED MORTALITY, EFFECTS ON BODY WEIGHT, THE IMMUNE SYSTEM AND THE UNBORN CHILD. PROLONGED, REPEATED SKIN CONTACT MAY CAUSE IRRITATION. DIESEL EXHAUST MAY CAUSE LUNG CANCER.

Keep away from heat and flame. Avoid prolonged or repeated overexposure by skin contact or inhalation. Use with adequate ventilation. Keep container closed. Keep out of reach of children.

FIRST AID: If inhaled, remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. In case of contact, remove contaminated clothing. Dry wipe the exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself and others. Wear impervious gloves. If swallowed, seek immediate medical attention. Do not induce vomiting. Only induce vomiting at the instruction of a physician.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product. Refer to product Material Safety Data Sheet for further safety and health information.

\*\*\*\*\*  
For Internal Use Only: MHC: 1\* 1\* 1\* 1\* 1\*, MPPEC: C, TRN: 123455-22,

CMCS97: EMGF22, REQ: PS+C, SAFE USE: C

EHS Approval Date: 03APR2003

\*\*\*\*\*

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Prepared by: ExxonMobil Oil Corporation

Environmental Health and Safety Department, Clinton, USA



123455-20 GASOLINE, UNLEADED AUTOMOTIVE  
MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: GASOLINE, UNLEADED AUTOMOTIVE  
SUPPLIER: EXXONMOBIL OIL CORPORATION  
3225 GALLOWS RD.  
FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency:  
CHEMTREC: 800-424-9300 202-483-7616  
LUBES AND FUELS: 281-834-3296

Product and Technical Information:

Lubricants and Specialties: 800-662-4525 800-443-9966  
Fuels Products: 800-947-9147  
MSDS Fax on Demand: 613-228-1467  
MSDS Internet Website: <http://emmsds.ihssolutions.com/>

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: GASOLINE AND PROPRIETARY ADDITIVES

GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
GASOLINE	100

COMPONENT(S) OF PRODUCT INGREDIENTS INCLUDE:

METHYL-TERT-BUTYL ETHER (1634-04-4)	< 16
ETHANOL (64-17-5)	< 11
XYLENE (1330-20-7)	10
TRIMETHYL BENZENE (25551-13-7)	8
TOLUENE (108-88-3)	6

ETHYL BENZENE (100-41-4)	3
N-HEXANE (110-54-3)	3
BENZENE (71-43-2)	2
NAPHTHALENE (91-20-3)	0.5

NOTE: The concentration of the components shown above may vary substantially. In certain countries benzene content may be limited to lower levels (eg. US reformulated gasoline). Oxygenates such as tertiary-amyl-methyl ether, ethanol, di-isopropyl ether, and ethyl-tertiary-butyl ether may be present (eg. concentration to provide a minimum oxygen content of 1.5 Wt% in the US). Because of volatility considerations, gasoline vapor may have concentrations of components very different from those of liquid gasoline. The major components of gasoline vapor are: butane, isobutane, pentane and isopentane. The reportable component percentages, shown in the Regulatory Information section, are based on API's evaluation of a typical gasoline mixture.

See Section 8 for exposure limits (if applicable).

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### 3. HAZARDS IDENTIFICATION

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This product is considered hazardous according to regulatory guidelines (See Section 15).

EMERGENCY OVERVIEW: Clear (May Be Dyed) Liquid. **EXTREMELY FLAMMABLE, HIGH HAZARD.** Liquid can release considerable vapor at temperatures below ambient which readily form flammable mixtures. Vapors settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of escape. Product can accumulate a static charge which may cause a fire or explosion. DOT ERG No. : 128

POTENTIAL HEALTH EFFECTS: Skin irritation. May cause eye and respiratory irritation, headache, dizziness, nausea, loss of consciousness, and in cases of extreme exposure, possibly death. Low viscosity material-if swallowed may enter the lungs and cause lung damage. Overexposure to benzene may result in cancer, blood disorders and damage to the bone marrow. Long-term exposure to gasoline vapor has caused kidney and liver cancer in laboratory animals. Case reports of chronic gasoline abuse (such as sniffing) and chronic misuse as a solvent or as a cleaning agent have shown a range of nervous system effects, sudden deaths from heart attacks, blood effects and leukemia. These effects are not expected to occur at exposure levels encountered in the distribution and use of gasoline as a motor fuel.

POTENTIAL ENVIRONMENTAL EFFECTS: Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

For further health effects/toxicological data, see Section 11.

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#### 4. FIRST AID MEASURES

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EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. Immediately remove contaminated clothing, including shoes. (See Section 16 - Injection Injury)

INHALATION: Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with mechanical device or use mouth-to-mouth resuscitation.

INGESTION: Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIANS: Material if ingested may be aspirated into the lungs and can cause chemical pneumonitis. PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE: Skin contact may aggravate an existing dermatitis. Benzene- Individuals with liver disease may be more susceptible to toxic effects. Hexane- Individuals with neurological disease should avoid exposure.

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#### 5. FIRE-FIGHTING MEASURES

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EXTINGUISHING MEDIA: Carbon Dioxide, Foam, Dry Chemical, Water Fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area. For large spills, fire fighting foam is the preferred agent and should be applied in sufficient quantities to blanket the product surface. Water may be ineffective, but water should be used to keep fire-exposed containers cool. Water spray may be used to flush spill away from exposures, but good judgement should be practiced to prevent spreading of the product into sewers, streams or drinking water supplies. If a leak or spill has not ignited, apply a foam blanket to suppress the release of vapors. If foam is not available, a water spray curtain can be used to disperse vapors and to protect personnel attempting to stop the leak.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: EXTREMELY FLAMMABLE, HIGH HAZARD. Liquid can release considerable vapor at temperatures below ambient which readily form flammable mixtures. Vapors settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of escape. Product can accumulate a static charge which may cause a fire or explosion.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): < -40(-40) (ASTM D-56).

Flammable Limits (approx.% vol.in air) - LEL: 1.4%, UEL: 7.6%

NFPA HAZARD ID: Health: 1, Flammability: 3, Reactivity: 0

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#### 6. ACCIDENTAL RELEASE MEASURES

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NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report



spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Eliminate sources of ignition. Warn occupants in downwind areas of fire and explosion hazard. Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping using explosion-proof equipment or contain spilled liquid with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Eliminate sources of ignition. Advise occupants and ships in the vicinity in downwind areas of fire and explosion hazard and warn them to stay clear. Notify port and other relevant authorities. Do not confine in area of leakage. Allow liquid to evaporate from the surface. Do not use dispersants.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

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7. HANDLING AND STORAGE

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HANDLING: USE NON-SPARKING TOOLS AND EXPLOSION-PROOF EQUIPMENT. NEVER SIPHON GASOLINE BY MOUTH. GASOLINE SHOULD NOT BE USED AS A SOLVENT OR AS A CLEANING AGENT. Avoid contact with skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources. This liquid is volatile and gives off invisible vapors. Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode. Use product with caution around heat, sparks, pilot lights, static electricity, and open flames. It is unlawful and dangerous to put gasoline into unapproved containers. Do not fill container in or on a vehicle. Static electricity may ignite vapors and cause fire. Place container on ground when filling and keep nozzle in contact with container. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Drums must be grounded and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters. Store away from all ignition sources in a cool, well ventilated area equipped with an automatic sprinkling system. Outside or detached storage preferred. Storage containers should be grounded and bonded.

SPECIAL PRECAUTIONS: To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Use the correct grounding procedures. Refer to national or local regulations covering safety at petroleum handling and storage areas for this product.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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### OCCUPATIONAL EXPOSURE LIMITS:

ExxonMobil recommends an 8-hour time-weighted average (TWA) exposure of 300 mg/m3 (100 ppm vapor).

Substance Name (CAS-No.)	Source	---TWA---		----STEL----		NOTE
		ppm	mg/m3	ppm	mg/m3	
<hr/>						
GASOLINE	OSHA	300	900	500	1500	
	ACGIH	300	890	500	1480	
METHYL-TERT-BUTYL ETHER (1634-04-4)	ACGIH	40	144			
	XOM	25		75		
ETHANOL (64-17-5)	OSHA	1000	1900			
	ACGIH	1000	1880			
XYLENE (1330-20-7) O, M, P, -Isomers	OSHA	100	435	150	655	
	ACGIH	100	434	150	651	
TRIMETHYL BENZENE (25551-13-7)	OSHA	25	125			
	ACGIH	25	123			
TOLUENE (108-88-3)  Skin	OSHA	100	375	150	560	
	ACGIH	50	188			
	XOM		200			
ETHYL BENZENE (100-41-4)	OSHA	100	435	125	545	
	ACGIH	100	434	125	543	
N-HEXANE (110-54-3)	OSHA	50	180			

Other Isomers	OSHA	500	1800	1000	3600
N-Hexane Skin	ACGIH	50	176		
Other Isomers	ACGIH	500	1760	1000	3500
BENZENE (71-43-2)					
Skin	OSHA	1		5	
	ACGIH	0.5	1.6	2.5	8
NAPHTHALENE (91-20-3)					
	OSHA	10	50	15	75
	ACGIH	10	52	15	79

NOTE: Limits shown for guidance only. Follow applicable regulations.

VENTILATION: Ventilation equipment must be explosion proof.

RESPIRATORY PROTECTION: Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the recommended exposure limit. Self-contained breathing apparatus may be required for use in confined or enclosed spaces.

EYE PROTECTION: If splash with liquid is possible, chemical type goggles should be worn.

SKIN PROTECTION: Impervious gloves should be worn. Good personal hygiene practices should always be followed.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid

COLOR: Clear (May Be Dyed)

ODOR: Gasoline

ODOR THRESHOLD-ppm: NE

pH: NA

BOILING POINT C(F): > 20(68)

MELTING POINT C(F): NA

FLASH POINT C(F): < -40(-40) (ASTM D-56)

FLAMMABILITY (solids): NE

AUTO FLAMMABILITY C(F): NE

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

VAPOR PRESSURE-mmHg 20 C: > 200.0

VAPOR DENSITY: 3.0

EVAPORATION RATE: NE

RELATIVE DENSITY, 15/4 C: 0.79

SOLUBILITY IN WATER: Negligible

PARTITION COEFFICIENT: > 1

VISCOSITY AT 40 C, cSt: < 1.0

VISCOSITY AT 100 C, cSt: NA

POUR POINT C(F): NA

FREEZING POINT C(F): NE

VOLATILE ORGANIC COMPOUND: NE

DMSO EXTRACT, IP-346 (WT.%): NA

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

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## 10. STABILITY AND REACTIVITY

---

STABILITY (THERMAL, LIGHT, ETC.): Stable.

CONDITIONS TO AVOID: Heat, sparks, flame and build up of static electricity.

INCOMPATIBILITY (MATERIALS TO AVOID): Halogens, strong acids, alkalies, and oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

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## 11. TOXICOLOGICAL DATA

---

### ---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Irritant. (Primary Irritation Index: 3 or greater but less than 5). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: Inhalation of high concentrations of vapors or aerosols/mists, especially deliberate or abuse exposure, may cause respiratory system irritation and damage. These exposures may also result in central nervous system depression and damage, possibly leading to death. Prolonged skin contact with gasoline may cause severe skin irritation similar to a chemical burn. The above effects, which may result from the whole gasoline or some of the gasoline components, are well documented in the medical literature. HAZARDS OF COMBUSTION PRODUCTS: Exposure to high concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage and death.

### ---SUBCHRONIC TOXICOLOGY (SUMMARY)---

Two dermal studies resulted in significant irritation in rabbits but no significant systemic toxicity. 90-day inhalation exposures (approximately 1500 ppm vapor) in rats and monkeys produced light hydrocarbon nephropathy in male rats, but no other significant systemic toxicity.

### ---NEUROTOXICOLOGY (SUMMARY)---

Exposure to high concentrations of unleaded gasoline in rodents caused reversible central nervous system depression, however, no persistent neurotoxic effects were observed in subchronic inhalation studies of gasoline blending streams. No neurotoxic effects, as measured by a functional observation battery, motor activity, and neuropathology, were observed in rats exposed to

light alkylate naphtha for 13 weeks at concentrations up to 6600 ppm. The medical literature clearly documents neurotoxic effects in humans from abusive gasoline inhalation (sniffing).

#### ---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Two separate inhalation teratology studies of unleaded gasoline vapor at exposures up to 1600 ppm and 9000 ppm for 6 hours/day on days 6-20 did not result in any significant developmental effects in rats. No significant effects were observed in the mothers or offspring. A two-generation inhalation reproductive study (CONCAWE) of unleaded gasoline showed no reproductive or developmental effects in rats exposed to concentrations up to 20,000 mg/m<sup>3</sup> (approx. 8000 ppm).

#### ---CHRONIC TOXICOLOGY (SUMMARY)---

A lifetime mouse skin painting study of unleaded gasoline applied at 50 microliters, three times weekly, resulted in some severe skin irritation and changes, but no statistically significant increase in skin cancer or cancer to any other organ. A lifetime inhalation study of vaporized unleaded gasoline at up to 2000 ppm caused liver tumors in female mice and increased kidney tumors in male rats. The kidney tumors resulted from the formation of a compound unique to male rats, and are not considered relevant to humans. The U.S. EPA Risk Assessment Forum concluded that the male rat kidney tumor results are not relevant for human risk assessment. The implications for the female mice liver tumor data for human risk assessment have not been fully determined. Multiple short-term cancer predicative tests (Ames Test, etc.) have routinely been negative (no cancer or mutagenic potential) for unleaded gasoline.

#### ---SENSITIZATION (SUMMARY)---

Unleaded gasoline was not a skin sensitizer in tests in a Buehler Guinea Pig Sensitization Assay.

#### ---OTHER TOXICOLOGY DATA---

Gasoline and Refinery Streams: Isolated constituents of gasoline may display these or other potential hazards in laboratory tests. Gasoline consists of a complex blend of petroleum/processing derived paraffinic, olefinic, naphthenic and aromatic hydrocarbons which include up to 5% benzene (with 1-2 % typical in the U.S.), n-hexane, mixed xylenes, toluene, ethylbenzene and trimethyl benzene. Benzene has also caused damage to the fetus of test animals in developmental studies. Benzene has tested positive (mutagenic) in a number of short-term cancer/mutation predicative tests. Repeated exposures to low levels of benzene (50-500 ppm) have been reported to result in blood abnormalities including anemia and, in rare cases, leukemia in both animals and humans. Prolonged exposure to n-hexane may result in a condition known as peripheral neuropathy. This is nervous system damage and is characterized by numbness of the extremities and, in extreme cases, paralysis. This product contains ethylbenzene. The International Agency for Research on Cancer (IARC) has evaluated ethylbenzene and classified it as possibly carcinogenic to humans (Group 2B) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans. Methyl Tertiary Butyl Ether (MTBE) was tested for carcinogenicity, neurotoxicity, chronic,

reproductive, and developmental toxicity. The NOAEL for all end points evaluated in three animal species was 400 ppm or greater. An increase in kidney tumors/damage and liver tumors was observed in animals exposed to high concentrations of MTBE. Some embryo/fetal toxicity and birth defects were observed in the offspring of pregnant mice exposed to maternally toxic doses of MTBE, however the offspring of exposed pregnant rabbits were unaffected. The significance of the animal findings at high exposures are not believed to be directly related to potential human health hazards in the workplace.

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## 12. ECOLOGICAL INFORMATION

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### ENVIRONMENTAL FATE AND EFFECTS:

In the absence of specific environmental data for this product, this assessment is based on information for representative substances.

**ECOTOXICITY:** Based on test results for similar products, this substance may be toxic to aquatic organisms such as algae and daphnia (EL50/ IrL50 = 1-10 mg/L). This substance has also been shown to be toxic to fish (LL50 = 1-10 mg/L).

**MOBILITY:** Dissolution of the higher molecular weight hydrocarbon components in water will be limited, but losses through sediment adsorption may be significant.

**PERSISTENCE AND DEGRADABILITY:** The majority of the components in this product are expected to be inherently biodegradable. When released into the environment, some of the constituents of gasoline will volatilize and be photodegraded in the atmosphere. The less volatile, more water-soluble components which are aromatic hydrocarbons will also undergo aqueous photodegradation.

**BIOACCUMULATIVE POTENTIAL:** Not established.

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## 13. DISPOSAL CONSIDERATIONS

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**WASTE DISPOSAL:** Product is suitable for burning for fuel value in compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

**RCRA INFORMATION:** Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity, or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

BENZENE: 2.0000 PCT (TCLP)

FLASH: < -40 (-40) C(F)

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## 14. TRANSPORT INFORMATION

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USA DOT:

SHIPPING NAME: Gasoline  
HAZARD CLASS & DIV: 3  
ID NUMBER: UN1203  
ERG NUMBER: 128  
PACKING GROUP: PG II  
STCC: NE  
DANGEROUS WHEN WET: No  
POISON: No  
LABEL(s): Flammable Liquid  
PLACARD(s): Flammable  
PRODUCT RQ: NA  
MARPOL III STATUS: NA

RID/ADR:  
HAZARD CLASS: 3  
PACKING GROUP: II  
LABEL: 3  
DANGER NUMBER: 33  
UN NUMBER: 1203  
SHIPPING NAME: Gasoline  
REMARKS: NA

IMO:  
HAZARD CLASS & DIV: 3  
UN NUMBER: 1203  
PACKING GROUP: PG II  
SHIPPING NAME: Gasoline  
LABEL(s): Flammable Liquid  
MARPOL III STATUS: NA

ICAO/IATA:  
HAZARD CLASS & DIV: 3  
ID/UN Number: 1203  
PACKING GROUP: PG II  
SHIPPING NAME: Gasoline  
SUBSIDIARY RISK: NA  
LABEL(s): Flammable Liquid

STATIC ACCUMULATOR (50 picosiemens or less): YES

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#### 15. REGULATORY INFORMATION

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US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.

EU Labeling: Product is dangerous as defined by the European Union Dangerous Substances/Preparations Directives.

Symbol: F+ T N Extremely flammable, Toxic, Dangerous for the environment.

Risk Phrase(s): R12-45-38-65-67-51/53.

Extremely flammable. May cause cancer. Irritating to skin.  
Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrase(s): S16-53-45-2-23-24-29-43-62.

Keep away from sources of ignition - No smoking. Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of the reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/drypowder/CO2. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Contains: Low Boiling Point Naphtha.

Governmental Inventory Status: All components comply with TSCA, EINECS/ELINCS, AICS, METI, DSL, KOREA, and PHILIPPINES.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III:  
This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES:  
FIRE CHRONIC ACUTE

This product contains the following SARA (313) Toxic Release Chemicals:

CHEMICAL NAME	CAS NUMBER	CONC.
BENZENE (COMPONENT ANALYSIS)	71-43-2	2%
PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE) (COMPONENT ANALYSIS)	95-63-6	3%
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	3%
TOLUENE (COMPONENT ANALYSIS)	108-88-3	6%
N-HEXANE (COMPONENT ANALYSIS)	110-54-3	3%
XYLENES (COMPONENT ANALYSIS)	1330-20-7	10%
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	<16%

The following product ingredients are cited on the lists below:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
GASOLINE		1, 8, 19, 20, 21, 23, 25
ETHYL ALCOHOL (COMPONENT ANALYSIS)	64-17-5	1, 6, 10, 18, 19, 20, 21, 23, 25, 26
BENZENE (COMPONENT ANALYSIS) (2.00%)	71-43-2	1, 2, 4, 6, 9, 10, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
NAPHTHALENE (COMPONENT ANALYSIS) (0.50%)	91-20-3	16, 22



PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE) (COMPONENT ANALYSIS)	95-63-6	1, 20, 24, 25
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1, 8, 10, 18, 19, 20, 21, 23, 24, 25, 26
TOLUENE (COMPONENT ANALYSIS) (6.00%)	108-88-3	1, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
N-HEXANE (COMPONENT ANALYSIS)	110-54-3	1, 10, 18, 19, 20, 21, 23, 24, 25, 26
XYLENES (COMPONENT ANALYSIS) (10.00%)	1330-20-7	1, 10, 18, 19, 20, 21, 22, 23, 24, 25, 26
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	1, 21, 24, 25
TRIMETHYL BENZENE (COMPONENT ANALYSIS)	25551-13-7	1, 10, 18, 19, 20, 21, 23, 25, 26

--- REGULATORY LISTS SEARCHED ---

1=ACGIH ALL	6=IARC 1	11=TSCA 4	16=CA P65 CARC	21=LA RTK
2=ACGIH A1	7=IARC 2A	12=TSCA 5a2	17=CA P65 REPRO	22=MI 293
3=ACGIH A2	8=IARC 2B	13=TSCA 5e	18=CA RTK	23=MN RTK
4=NTP CARC	9=OSHA CARC	14=TSCA 6	19=FL RTK	24=NJ RTK
5=NTP SUS	10=OSHA Z	15=TSCA 12b	20=IL RTK	25=PA RTK
				26=RI RTK

Code key: CARC=Carcinogen; SUS=Suspected Carcinogen; REPRO=Reproductive

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16. OTHER INFORMATION  
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USE: UNLEADED MOTOR FUEL

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Precautionary Label Text:

CONTAINS GASOLINE, BENZENE, AND ETHYLBENZENE

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. CAUSES SKIN IRRITATION. RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, AND IN CASES OF EXTREME EXPOSURE, POSSIBLY DEATH. LOW VISCOSITY MATERIAL-IF SWALLOWED, MAY BE ASPIRATED AND CAN CAUSE SERIOUS OR FATAL LUNG DAMAGE.

OVEREXPOSURE TO BENZENE MAY RESULT IN CANCER, BLOOD DISORDERS, AND DAMAGE TO THE BONE MARROW. LONG-TERM EXPOSURE TO GASOLINE VAPOR HAS CAUSED KIDNEY AND LIVER CANCER IN LABORATORY ANIMALS, BLOOD EFFECTS, AND NERVOUS SYSTEM DAMAGE.

Keep away from heat, sparks, and flame. Avoid all personal contact. Avoid prolonged breathing of vapor. Use with adequate ventilation. Keep container closed. Approved portable containers must be properly grounded when transferring fuel. For use as a motor fuel only. Misuse of gasoline may cause serious injury or illness. Never siphon by mouth. Not to be used as a solvent or skin cleaning agent.

FIRST AID: In case of contact, wash skin with soap and water. Immediately remove contaminated clothing, including shoes. Destroy or wash clothing before reuse. If swallowed, seek immediate medical attention. Do not induce vomiting. Only induce vomiting at the instruction of a physician.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product. Refer to product Material Safety Data Sheet for further safety and health information.

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For Internal Use Only: MHC: 1\* 1\* 1\* 1\* 2\*, MPPEC: CF, TRN:  
123455-20, CMCS97: EMGF20, REQ: PS+C, SAFE USE: G  
EHS Approval Date: 03APR2003  
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